

All Electron User
programs work on
BBC Micros with
OS 1.2 and Basic 1.1

A Database Publication

electron user

Vol. 1 No. 8 May 1984 £1

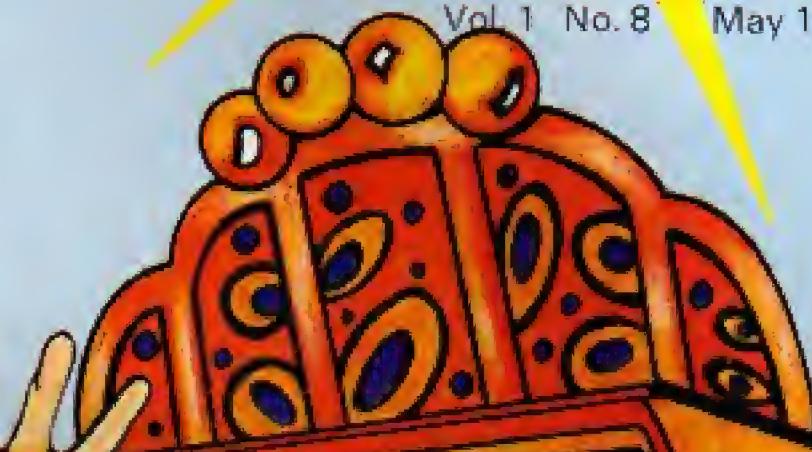


Test your skill
at rally driving

Send secret messages
with our micro coder

More helpful advice
for first-time users

Play your Electron
at Tic-Tac-Toe



Spin the
wheels of
fortune!
See Page 42

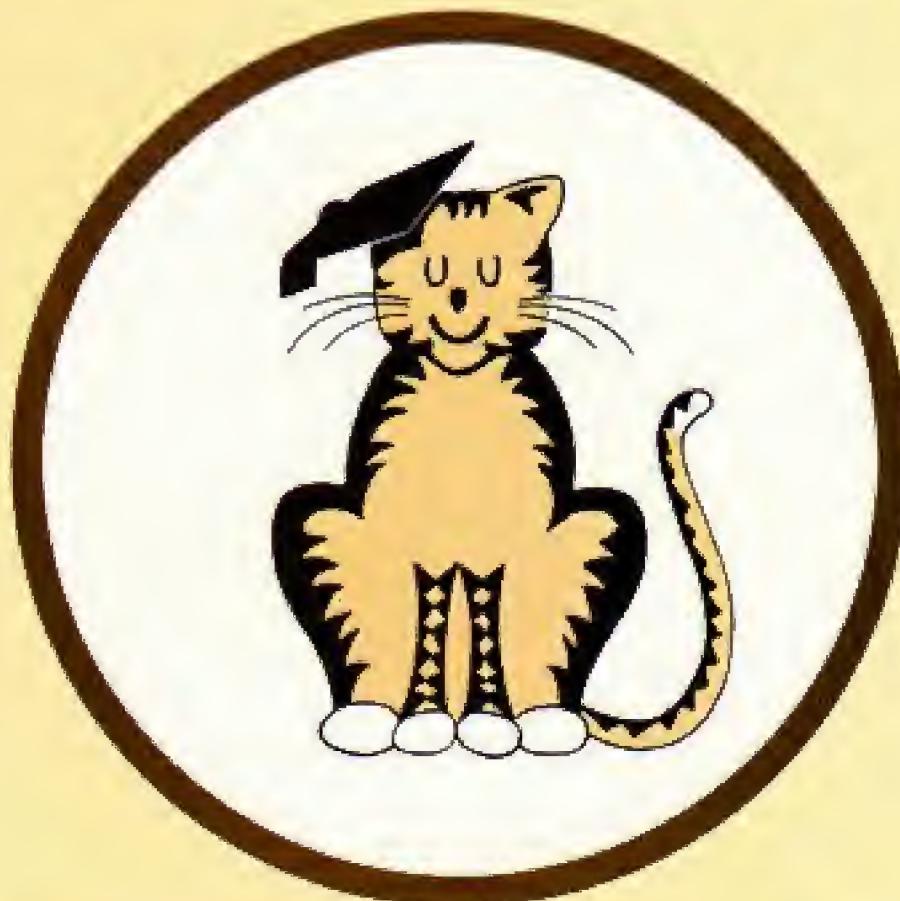


Win a Joyport
joystick interface
in our FREE
competition



Exciting News for Electron Users
Now Available

**CHESHIRE CAT
EDUCATIONAL SERIES
from
AMPALSOFT**



CHESHIRE CAT

The First name in Educational Software.

An exciting range of top quality programs covering all
needs from pre-school to 'A' level.

Ampal Computer Services Ltd.
31 Woodbridge Road, Darby Green, Blackwater,
Camberley, Surrey.
Tel: (0252) 876677

Ring 0252 876677
for your nearest stockist

News

All that's new in the growing world of the Electron.

7

Beginners

Part four of Pete Bibby's gentle introduction to very basic Basic.

10

Program Probe

An in-depth analysis of graphics windows at work.

14

Rally Driver

All the thrills of high speed driving with none of the risks.

18



Electron User Offers

There's cassettes, back numbers and lots, lots more for the keen Electron user.

46

Shady Characters

Peter Grey lets the micro do the work.

48

Notebook

A simple graphics program explained.

20

Coder

Use your Electron to send secret messages.

22

Graphics

Colourful text made easy as we explore the Electron's palette.

23

Cassette offer

Save yourself a lot of typing - we've got our programs taped!

24

Chaser

Speed, skill and luck are needed in this two player game.

27

Sheep

A program for insomniacs - full of woolly jumpers.

28

Software Surgery

All you want to know about the latest in software from our frank reviewers.

51

Maths Workout

More about Electron number systems, made simple.

54

Draughtsman

Use your Electron as a drawing board with Mike Cook's latest program.

29

Maths Hike

Let the Electron strain your brain with this test of mental arithmetic.

37

Competition

Time to exercise your imagination - and win yourself a Joyport.

31

Sounds Exciting

Extend your library of sound effects with the latest collection of Electron noises.

32



Space Pods

A relentless battle against yet more aggressive aliens.

34

Tic-Tac-Toe

Play your Electron at noughts and crosses.

38

Casting Agency

Shapes from our readers to brighten your programs.

40

Fruit Machine

Spin the wheels and take a risk with your Electron.

42

What's That?

ROM, and RAM, and Mike Cook to explain the difference.

44

Star

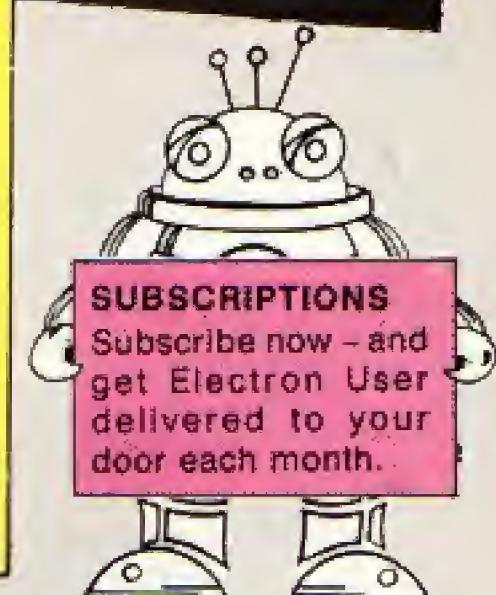
Axes, ellipses and simple trig add up to a pretty pattern.

56

Micro Messages

The pages you write yourself. A selection from our mailbag.

61



Managing Editor
Derek Meakin

Features Editor
Pete Bibby

Production Editor
Peter Glover

Layout Design
Heather Sheldrick

Advertisement Manager
John Riding

Advertising Sales
John Snowden

Marketing Manager
Sue Casewell

Published by Database Publications Ltd

Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Telephone: 061-456 8383 (Editorial) 061-456 8500 (Advertising)

Subscriptions: 061-480 0171 Telex: 667664 SHARETG. Prestel: 614568383.

Subscription rates for 12 issues, post free:

£12 UK

£13 Eire/NR £16

£20 Europe

£20 Rest of world (surface)

£40 Rest of world (airmail)

Trade distribution in the UK and overseas: Contact Steve Fletcher, Circulation Manager of Database Publications at the above address, or telephone him on 061-480 4153.
Electron User is an independent publication. Acorn Computers Ltd, manufacturers of the Electron, are not responsible for any of the articles in this issue or for any of the opinions expressed.

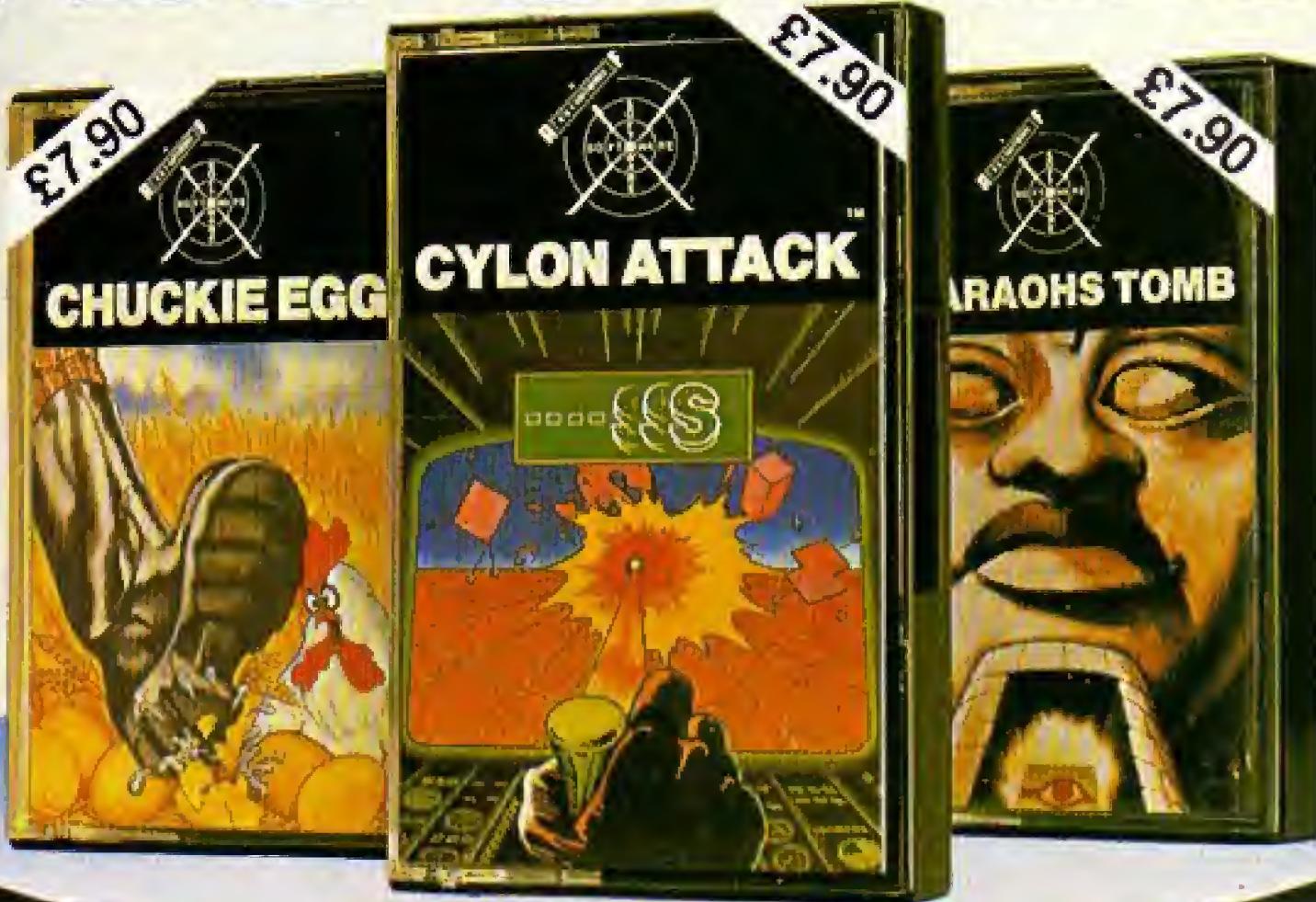
Electron User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope; otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an-all-rights basis.

© 1984 Database Publications Ltd. No material may be reproduced in whole or in part without written permission. While every care is taken, the publishers cannot be held legally responsible for any errors in articles or listings.

"ATTENTION EARTHILINGS..."



...Beam us down to A&F Software."



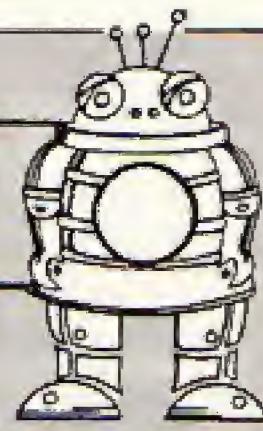
	BBC	ELECTRON	DRAGON	SPECTRUM
CHUCKIE EGG	✓	✓	✓	✓
CYLON ATTACK	✓	✓		
JUNGLE FEVER				✓
PHARAOHS TOMB	✓	✓		✓



Available from W.H. Smiths,  John Menzies and all leading computer stores.

Unit 8, Canalside Industrial Estate,
Woodbine Street East, Rochdale, Lancs.
OL16 5LB. Tel: 0706 341111

Electron Eddie-torial



ONE of the good things about this job is that I get to meet a lot of nice people who are interested in the same sort of things I'm interested in. That's anything to do with the Electron.

I first came across this when I worked on *The Micro User* in the (thankfully) dim and distant past.

An article or letter would come in from someone called Fred Bloggs who I'd never heard of and it would be used in the magazine.

Later another article or a game would turn up, or I'd meet Fred Bloggs at one of our shows and he'd become a friend.

Some regular contributors I've never even met,

Calling Fred Bloggs!

but they're friends for all that.

Several of these Fred Bloggses have wisely followed me onto *Electron User*, providing articles, inspiration, and a sense of humour.

Mike Cook, Allen Plume and Trevor Roberts, to name but three, came from my *Micro User* days and it's nice to have their support on *Electron User*.

There are, however, quite a few more Fred Bloggs coming to the fore, Electron-using Fred Bloggs who have never written for a magazine before. They

usually start their letter: "You probably won't want to use this, but . . .".

One has a penchant for writing programs that move animals across the screen. Another is a school teacher who has become a regular reviewer and promises an article on using the Electron in schools.

And then there's Merlin, our adventures man who just appeared like magic, and another programmer who hails from Fairyland (honest, that's the name of his road).

All were just letters and cassettes on my in-tray at

one time. Now they're part of the *Electron User* team.

And every day more contributions from new Fred Bloggs arrive on my desk.

I never know what I'm going to get in the post, or who it's from. There's always something original from someone who I'd never heard of.

It's great fun going through the mail. I'm getting lots of features for *Electron User* and I'm discovering a lot of interesting people.

Your name's not Fred Bloggs, is it?

TO **electron**

Signpoint Ltd.
Computer Technology
USERS & DEALERS

The first Joystick Interface
on the market.

JOYPORT

Controls over 80% of
available arcade games.

Unlike others, our product is
intelligent and in stock.

- * Uses 'Atari style' 9 pin joysticks
- * Just plugs in, no soldering
- * Full after sales support.
- * Does not overload the limited
Electron power supply.

£16.95 inc vat and P & P

Same Day Despatch

ALSO IN STOCK

PRINTPORT

Centronics Printer Interface.

- * Suitable for all Centronics Printers.
- * Recognises *FX, VDU & CTNL Codes.
- Supplied complete with lead and software.

£44.95 inc vat and P & P

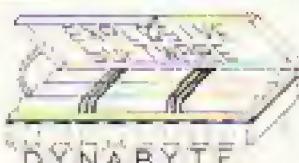
Send cheques to :-

Signpoint Ltd.,
166a Glyn Road,
London E.5.

DYNABYTE

EXPLOSIVE

Software



DYNABYTE

NEW! Lemming Syndrome



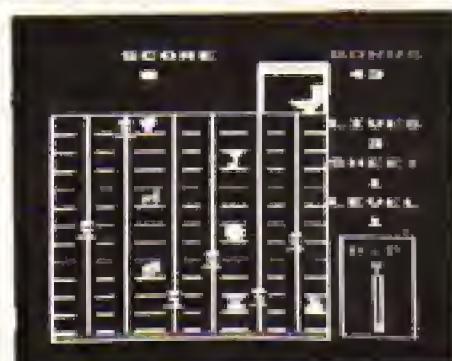
Mad Marco is on the rampage and has blown the bridge to the mainland. The panic-stricken population are hurling themselves into the shark infested waters and your job is to bounce them to safety whilst avoiding the marauding sharks and the desperate attempts of Marco to blow up your liferaft. This highly original, fast and furious game is full of special features and options designed to make your task harder as you get better.

Machine Code £7.95

Corporate Climber NEW!

Caught in the capitalistic pursuit of corporate expansion, your ambition is to attain the ultimate accolade - the key to the executive washroom! Avoid the eager taxmen in the lifts ready to hinder your climb to power and beware of too much stress resulting in high blood pressure. Definitely not for the faint hearted entrepreneur.

Machine Code £7.95



All programs available from most good computer shops or direct from

DYNABYTE SOFTWARE (Dept. EU5)

31, Topcliffe Mews, Wide Lane, Morley, LS27 8UL.

SAE for Catalogue

(Please include 50p p&p)

Trade Enquiries Phone: 0532-535401

Exciting and original software for the Acorn Electron

Pool



Classic representation of the real thing incorporating excellent high resolution smooth action graphics for accuracy and making full use of sound. Start practising now and avoid being hustled. You control the cue angle and strength of shot. A real pleasure to play.

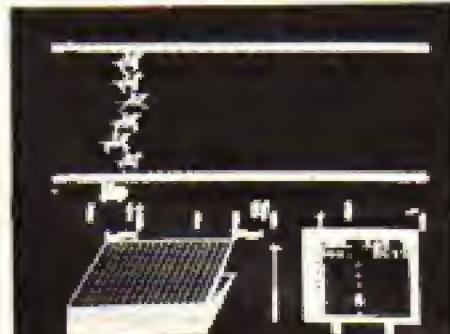
Machine Code £7.95

HORSERACE

An exciting and colourful game complete in every detail with tumbling jockeys, realistic horses, TV van, tote and leader boards, waving crowds and much more. Don't lose your money at the track, try HORSERACE instead. Suitable for 1-6 players.

Basic + M/C £6.95

(All programs require Series 1.0S)



Also available:

ELECTRON-AJD. An extremely useful 2 program utility which simplifies some of the more difficult aspects of programming your computer.

CHARACTER. Easily defines/edits multicoloured characters. VDU 23 statements are automatically generated and can be saved for later use. Characters also displayed normal size on screen.

SOUND LAB. Experiment with up to 7 envelope and 15 sound commands simultaneously. Sounds can be played individually or in sequence. All parameters clearly displayed and easily altered.

Comes complete with full documentation and a user key strip.

Excellent value at only £6.95

KAY-ESS

COMPUTER PRODUCTS

**PROFESSIONAL
PROGRAMS FOR
THE MODEL B
AND ELECTRON**

SPACE TRAFFIC CONTROLLER—“NEW” (B)(E)

£6.95

As a space traffic controller you have been stationed at the main robot cargo port of the planet Ore-7. It is your job to get the robot spacecrafts down in one piece. As your confidence increases you can increase the number of crafts allowed within your control area. Warning: not to be played after a hard or hectic day! Pause option.

SPACE TANK (B)

£6.95

After you SPACE TANK has landed on the planet Orion, a series of alien tanks, surface hoppers, and spacecrafts will attack. How long can you hold out commander? This game makes use of the Beeb's fast scrolling ability. Can be used with either keyboard or joysticks. Top ten table. Pause option.

HORSES (B)(E)

£6.95

Come on now, don't be shy, choose one of the six horses and let's see what you can do. How many of the fences can you complete at the Orion arena, especially with the clock ticking away? New riders can try one of the more docile horses while others may like to risk one of the more lively beasts! Can be used with either keyboard or joysticks. Top ten table. Pause option.

STAR HAWKS (B)(E)

£6.95

Can you stop the STAR HAWKS before they stop you? Slow work means the generation of more laser firing mutant hawks. Based on the games of Galaxian and Gorf. Can be used with either keyboard or joysticks. Top eight table. Pause option.

DESIGN (B)(E)

£6.95

If you like watching your user defined characters run around the screen but are fed up with the time consuming mathematics, then DESIGN is for you! With DESIGN you can draw your characters on an 8x8 grid and let the machine do all the work. DESIGN's features include being able to recall characters for re-editing, displaying VDU 23 commands, and amendable cursor. All characters used in KAY-ESS programs are created using DESIGN.

KAY-ESS programs are now becoming available at local dealers.

Dealer enquiries welcome.

KAY-ESS computer products previously traded under the name of ORION SOFTWARE.

HANGMAN (B)(E)

£5.95

Let words become fun again with our three language (ENGLISH, FRENCH, ITALIAN), version of the popular game of HANGMAN. There are 3 levels of play for each language. All words can be replaced or removed, and new ones can be added. HANGMAN comes with an instruction program giving full details for parents and teachers. Once running prying eyes cannot access the word lists!

* CURRENT BEST SELLERS *

EARLY YEARS 1 and 2 (B)(E) £7.95 EACH or £14.00 FOR BOTH

These two packages are designed to help a young child with some of the simple concepts that they will need in the world. The emphasis is on learning through fun with simple game type tasks to enforce idea's. 'Time tables' are out and Fred the Frog is in! Topics covered include subtraction, addition, recognition, colour, shapes, sizes, sounds/notes, co-ordination, distances, estimates, directions.

EARLY YEARS 1

- A) MICKEY THE MONKEY and his apple tree make subtraction fun.
- B) COLOUR BLOCKS bring sizes and colours into perspective.
- C) MERRY MUSIC turns the keyboard into a musical keyboard.
- D) FUNNY FACES presents a line up, which one is the suspect?
- E) FRED THE FROG needs co-ordinated help to get across the pond.

EARLY YEARS 2

- A) THE POND seems very active today
- B) SPEED is required to keep the cake on the conveyor belt.
- C) DIRECTIONS seem to be needed by everyone in Orion village.
- D) ORDER the blocks.
- E) SID THE SPIDER needs some help to get out of the maze.

For children between 4-8 years of age.

Cheques/P.O.'s should be made payable to KAY-ESS computer products. All prices are fully inclusive. MAIL ORDER ONLY.

Available for:
(E) Electron (B) BBC Model B
FREE with all orders is
our 3 level version of
NOUGHTS AND CROSSES!!!

KAY-ESS Computer Products,
11 Buttercup Close,
Romleights Park,
Harold Wood,
Essex RM3 0XF.

electron NEWS

Electron utilities start to pour onto market

ELECTRON software has now left its infancy with the release of a growing number of utilities programs.

The first wave of programs for the Electron consisted almost inevitably of games. These were mostly arcade games but adventures soon followed.

Then, as reported in last month's *Electron User*, educational programs started to head the new releases.

Software companies, already experienced on the BBC Micro, realised that the Electron's potential in the educational field opened up a whole new market.

Now software has entered a third phase, that of the utilities.

Utility programs are neither games programs nor specifically educational. They are designed to make use of the Electron as a tool, rather than a toy or a teaching machine.

From Superior Software of Leeds comes

the Electron Disassembler, a utility which allows the user to explore the workings of the Electron's ROM, its operating system and Basic.

The disassembler translates machine code, the Electron's operating language, into

the rather more intelligible assembly language.

Another Leeds-based firm, Dynabyte, have produced Electron-Aid, a utility which consists of two programs.

The first, Character, allows the creation and revision of multi-

coloured characters.

The second, Soundlab, allows experimentation with the Sound and Envelope commands.

From Salamander Software of Brighton comes the Graphics System, a utility which provides an advanced

picture drawing system for Electron users.

This third wave has only just begun. But with software being produced covering such diverse topics as astronomy and personal accounts, it promises to be the most interesting yet.

...AND ADD-ONS ARE ON THE INCREASE, TOO



First Byte's switched joystick interface

Deliveries improve

THE Electron famine appears to be slowly easing. Dealers are reporting that, while they are still not getting all the Electrons they could sell, deliveries are increasing.

Hopes are that by the end of summer the huge

backlog will be easing.

Meanwhile Acorn are becoming more open about what has been causing the problems.

Acorn's marketing manager, Tom Hohenberg admitted that a lot of the trouble stemmed from the ULA, the

custom made chip at the heart of the Electron.

The world chip shortage made the situation worse.

Things are getting better but Acorn are carefully avoiding giving the numbers of Electrons being produced.

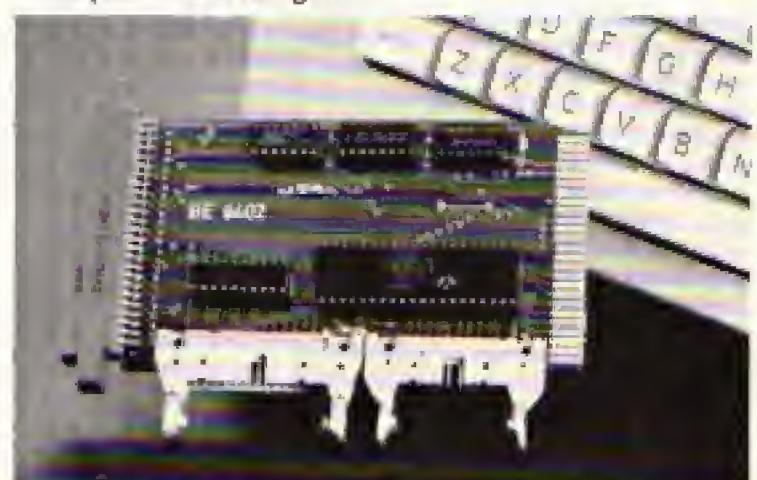
AT ONE time seemingly as elusive as the Electron itself, hardware add-ons are reaching the market in increasing numbers.

Derbyshire based First Byte Computers chose the *Electron and BBC Micro User Show* to release their switched joystick interface.

Capable of taking all

standard "Atari-style" joysticks, FBC say that reading the interface is considerably quicker than normal keyboard input or reading an A/D converter.

They have sent pre-production interfaces to all the leading software houses in an effort to



Broadway interface has a dual role



THE DAY A GHOST GOT AN ELECTRONICS UPDATE

THE GHOST of electronics pioneer Sebastian de Ferranti materialised recently – just to get a glimpse of the Electron.

Complete with silver topped cane, tail coat and bowler hat, the apparition of the Victorian gentleman almost brought a northern town to a halt as he dropped into its main micro shop.

It was all for the benefit of a government film unit which had resurrected the 19th century genius in the form of actor John Rankin for a television programme about the micro revolution.

The film, which has been booked by 60 TV stations around the world, aims to highlight the enormous progress

made since the days de Ferranti became a pioneer in the large scale use of electricity and brought light into millions of British homes.

Born in Liverpool in 1864, Sebastian de Ferranti invented Britain's first major power station, and the company that still bears his name is now prominent in making micro chips for computers.

The aim of the film crew at Wilmslow Micro Centre was to shoot footage of the ghost examining the Electron – at the heart of which lies a unique chip manufactured by Ferranti at Chadderton.

However, the actor playing the part was first to admit when it came to electronics he couldn't hold a candle to Ferranti himself.

"I'm afraid it's a subject way above my head", 28-year-old

John Rankin told *Electron User*.

The film's director did not see this as a disadvantage.

"What we have been trying to capture here is the amazement that would have been felt by de Ferranti at what has been happening in the last 100 years or more", he said.

ADD-ONS BOOM

From Page 7

standardise joystick software.

From Broadway Electronics of Bedford comes a combined printer interface and user port.

Complete with drive software and screen dump routine, the module is claimed to be fully centronics com-

patible and designed with future expansion in mind.

In the pipeline are a disc interface, joystick controls and sideways ROM board, together with a motherboard for multiple installation.

Meanwhile Acorn are promising their own Electron printer and joystick interface for late May.

No close-down

REPORTS that the Electron production line in Malaysia has been shut down have been strongly denied by an Acorn spokesman.

Contradicting rumours that production difficulties had led to its closure, he said confusion may have arisen because the first Malaysian contract was

BT sign Electron boards contract

ACORN has signed a "cast iron" contract with British Telecom guaranteeing the delivery of several thousand Electron boards by the second half of this year.

They are to be incorporated into the new Merlin Healthnet Workshop which, although still under wraps, is set to be marketed later this year.

Designed to provide an electronic mail link between health centres and local hospitals, the workstation is already generating considerable interest within the health industry.

"We selected the Electron board because of its suitability and price, and the fact it has a real keyboard", a BT spokesman told *Electron User*.

Asked how they could be assured of deliveries while Acorn still has a backlog of more than 200,000 orders for the Electron to be filled, the BT spokesman replied:

"We have an absolutely cast iron contract with Acorn which guarantees us delivery..."

coming to an end.

"All that has happened is that they have produced the number of Electrons they were under contract to produce", he said.

He declined to tell *Electron User* how many that was, or whether there would be another contract with the Malaysian producers.

Regardez!



NEW
ELECTRON
PROGRAMS

- ★ Pupils
- ★ Teachers
- ★ Travellers
- ★ Students
- ★ Graduates
- ★ Linguists
- ★ In fact anyone having an interest in French will benefit from this unique language learning aid
- ★ Also available for BBC model B SPECTRUM 48K

- ★ Ready made lessons provide an enormous vocabulary of words, phrases and verbs arranged in subject groups.
- ★ Lessons can be run in three ways; learning, self-test or speed and accuracy test where you key in the answers.
- ★ Lesson displays include all French accents, different colours for masculine and feminine words.
- ★ Full tape editing facilities allow an infinite number of new or updated lessons to be created and stored for later use.

Choice of Level A or B cassettes with totally different vocabularies.

£9.95 each (P&P inc.)

Both cassettes include extensive word lists; verbs and phrases are introduced in Level B. Available from dealers or mail order.

State BBC, Spectrum or Electron

Also available 'The German Master' 'The Spanish Tutor'.

KOSMOS
SOFTWARE

Unit B

1 Pilgrims Close, Harlington,
Dunstable, Beds. LU5 6LX

Tel: 05255 3942

EPIC ADVENTURES

FULL-SCALE MACHINE CODE ADVENTURES FOR THE BBC AND ELECTRON

OUR AMAZING NEW ADVENTURE IS NOW AVAILABLE

THE WHEEL OF FORTUNE

They said it couldn't be done on the Beeb - but we've done it!

The Wheel of Fortune is a classic puzzle adventure, with 250 locations, and brings the following advanced features together for the first time:

- * Sophisticated language and speech interpreters capable of accepting single or multiple commands, up to 254 characters in length. Complex multiple commands are phrased just as you would speak them.
- * Moving characters with varying moods. These characters remain active whether you type anything or not. Their reactions to you will depend upon the way in which you have previously treated them. The speech interpreter allows you to talk to them, to either give them commands or information, or to ask them questions.
- * Instant half-screen teletext graphics for each location (BBC only). These remain on screen with the text and both may be studied simultaneously. The graphics may be switched on or off, as required.
- * You may save your position on tape OR DISC, using a different filename for each position.
- * Up to 10 commonly-used command sentences can be stored and called up as required. The stored sentences may be changed during the game.
- * No frustrating illogical mazes * Humorous character behaviour * Scoring * Fast response * Fully disc compatible * Etc. Etc.

This masterpiece of programming is available for BBC or Electron (state which) for only £9.95

Also available are our 3 popular text adventures. Each has approx. 230 locations and costs just £7.95
1) Castle Frankenstein 2) The Quest for the Holy Grail 3) The Kingdom of Klein
P&P FREE if ordering 2 or more games, otherwise add 50p

EPIC SOFTWARE

DEPT E4

10 GLADSTONE STREET, KIBWORTH BEAUCHAMP, LEICESTER LE8 0HL

Please make cheques payable to EPIC SOFTWARE

All our programs are available for immediate despatch

Dealer enquiries welcome

ANSWER BACK

SENIOR

QUIZ

GENERAL KNOWLEDGE

THE ULTIMATE EDUCATIONAL QUIZ FOR AGES 12 & OVER

BBC (32K)•ELECTRON

The ANSWER BACK Quiz provides an incredible adventure in education by combining a compelling Space-Age game with an immense series of questions on General Knowledge. The thought-provoking and well-researched quizzes contain an enormous total of 750 questions with 3000 answer options covering the following subjects:

- Astronomy Music Natural History Famous People Science Sport
- History Art and Architecture Know your Language Discoveries and Inventions Legends and Mythology Geography Literature
- Films, TV and Theatre Pot Luck

The highly sophisticated control program rewards each correct answer with another turn in the colourful, animated game.

FEATURES INCLUDE

- Multiple choice answers True or False? Find the missing letters
- "Pass" facility Immediate correction of errors Timer option
- Performance summary Re-run of questions passed or incorrectly answered Full facilities for creating and saving an unlimited number of new quizzes

Available from your computer store or by mail order Price: £10.95.

AVAILABLE SHORTLY:
ANSWER BACK
Junior Quiz
for the under 11's



The ANSWER BACK Senior Quiz will educate and fascinate ANYONE over 11 years old.

KOSMOS SOFTWARE, 1 Pilgrims Close, Harlington, DUNSTABLE, Beds. LU5 6LX
Please send me the ANSWER BACK Senior Quiz for the BBC/ELECTRON computer.

Mr/Mrs/Miss...

Address

Post code

I enclose a cheque/postal order for £10.95 payable to KOSMOS Software

Name your numbers and LET them have some sp

IN the last article we covered strings, collections of letters and symbols that we want the Electron to treat as one lump.

We saw that we could use labels ending in the dollar sign, \$, to refer to these strings.

It wasn't all that exciting but we found we could run programs like this:

```
10 REM PROGRAM I
20 LET A$=" GRAIN "
30 LET B$=" DOG "
40 LET C$=" DUCK "
50 PRINT A$;B$;C$
60 PRINT B$;A$;C$
70 PRINT C$;A$;B$
```

Not exactly earth-shattering, but the program does have its important points.

Notice how once I had assigned A\$, B\$ and C\$ with the LET statements in lines 20, 30 and 40, I was then able to use the labels, or string variables, to print out three different messages.

I saved myself some typing by using the variable names.

So far we've only given labels to strings. You might ask if we can give labels to numbers and the answer is yes, as shown here:

```
10 REM PROGRAM II
20 LET A=3
30 LET B=5
40 PRINT A+B
```

Ignoring the fact that we could do it in our heads, let's look at the principles involved in Program II. Once you've grasped them, programming will become much simpler.

Line 10 is just the REM statement giving the title of the program.

Line 20 uses a LET command to assign a value of 3 to the variable named A.

All this means is that when

we refer to A, as we do later in the program, the Electron will know that we mean the number 3.

Similarly, line 30 gives B the value 5. Line 40 now adds the two together. We could of course have just had line 40 as:

40 PRINT 3+5

and it would work just as well.

The point is that in Program II we used A and B, two numeric variables. The Electron was quite happy to use the labels rather than the actual numbers in the final addition. It still gave the correct answer.

If we wanted, we could even add the two variables together and refer to the result by another label. Then we could use a PRINT command to display the result.

Program III shows this method in action:

```
10 REM PROGRAM III
20 LET H=330
30 LET M=430
40 LET Z=H+M
50 PRINT Z
```

Line 20 gives the variable H the value of 330, and line 30 labels 430 with the name M.

What line 40 does is to tell the micro to add together H and M and give the result the label Z. Line 50 then goes on to display Z.

The point to grasp is that we can do calculations like the above sum just using variable names and let the result have a variable name. While this example is ridiculously easy for the Electron, the principles involved will apply throughout your computing career.

Notice that it doesn't matter what values we give to H and M in Program III. Lines 40 and 50 will still give the correct answer.

Whatever the numbers assigned to the variables in lines 20 and 30, lines 40 and 50 are arranged so that the two figures are added and the result printed out.

Try typing in lines 20 and 30 with different figures in them and you'll see that the program still adds the two numbers together.

The numbers may differ, but the action of the program remains the same.

This use of labels or variable names can save us quite a lot of time and trouble. Have a go at Program IV and you'll see how.

```
10 REM PROGRAM IV
20 LET D=100
30 LET E=200
40 PRINT D+5,D-5,D*2,D/20
50 PRINT E+24,E-16,E*2,E/25
60 PRINT E-D,D-E,E*D,E/D
```

The last three lines of the program give us the results of 12 different calculations using the two variables D and E.

If we wanted to do the same calculations with two other numbers such as 400 and 800 the only lines we'd have to change would be lines 20 and 30.

We'd just give the labels D and E the new values. The rest of the program would stay unchanged and give the required results.

The new lines would be:

```
20 LET D=400
30 LET E=800
```

The program is quite powerful. We can assign any two numbers to the variable names in lines 20 and 30 and it will perform the correct calculations.

The Electron will do the same thing, carry out exactly the same operation on dif-

ferent numbers with very little effort.

Just by changing the values of the variables we could perform hundreds of calculations, far faster than we could on paper — and that is the essence of computing.

Now let's change the subject a little and look at what a LET statement actually does.

We've said it gives a label to a number or a string and that we can refer to that string or number by that label. This is true but there's a little more to it than that.

You probably already know your Electron has 32k of memory for you to use.

This can be looked on as an electronic scrap pad. It's here that all your programs are stored in coded form.

We won't bother about the technicalities of memory, it's not needed at this stage.

We will, however, take a look at what the LET command does with the memory.

Suppose we have a line like:

```
10 LET X=3
```

What this does is to tell the Electron to set aside a part of memory to store a number in. It knows that it's a number, not a string, as the name doesn't end in \$.

It is to call this reserved part

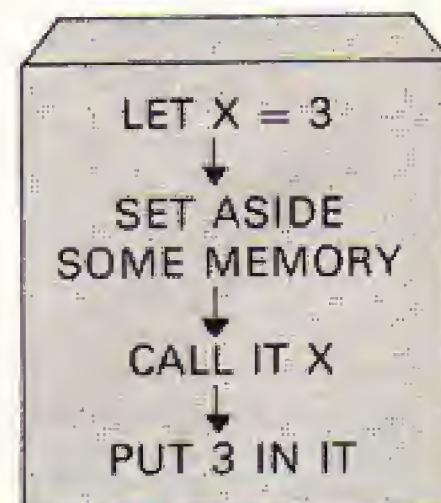


Figure 1: Assigning a variable

of memory *X* and it is to put the value 3 into it. Figure 1 shows this in operation.

Now, when the Electron comes to an *X* in a program it will search through the memory for the part called *X* and use the value it finds stored there.

Should there be no piece of memory labelled *X* it will tell you so with an error message.

If, later on in the program, we have a line such as:

200 LET *X*=?

this will cause the Electron to look through its memory for the part called *X* and store the value 7 in it. Now if we have a line such as:

210 PRINT *X*

it will print out the value it finds in the part of memory labelled *X*, which is 7.

The old value has gone, the memory only keeps the last value given to that label.

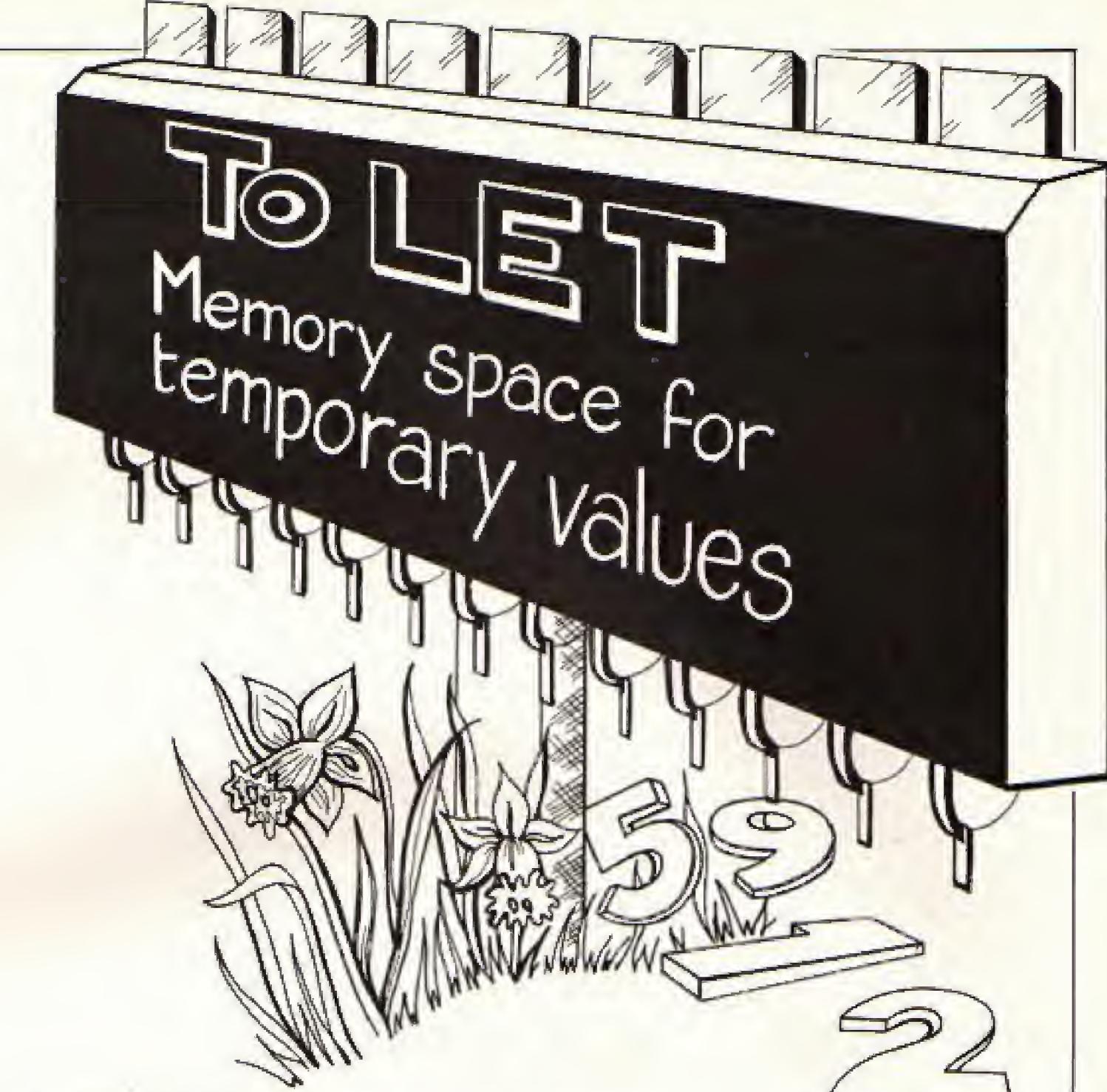
So, to summarise, when we give a number a label, we are setting aside a space in memory, calling that space by the label.

When we later use the label in a program the Electron searches its memory until it finds the part with that label and gives the program whatever value it finds there.

Program V shows this in action. Line 20 sets aside a piece of memory and calls it *T*. Line 30 tells the Electron to display the value it finds in that part of memory labelled *T*.

Line 40 tells the Electron to find the part of memory labelled *T* and put the value of 2 in it.

Line 50 then prints out the value the micro finds in the part of memory labelled *T* which is now the number 2. I leave it to you to find out what lines 60 and 70 do!



```
10 REM PROGRAM V
20 LET T=1
30 PRINT T
40 LET T=2
50 PRINT T
60 LET T=3
70 PRINT T
```

Now that you've done all that typing, I'll let you into a secret about LET. You don't have to use it in the BBC Basic used by the Electron. The Electron will interpret a line such as:

10 P=5

as:

10 LET P=5

In both cases, *P* now stands for 5. This means that we could have written Program III as:

```
10 REM PROGRAM III
15 REM (without LET)
20 H=330
30 M=430
40 Z=H+M
50 PRINT Z
```

and the Electron would accept it. From now on I won't be

using LET, I'll let the micro assume it.

So far the programs we've used have only had single letter variable names, all in capital letters.

We can, however, use longer, more meaningful names provided that they obey the rules set out in Table I.

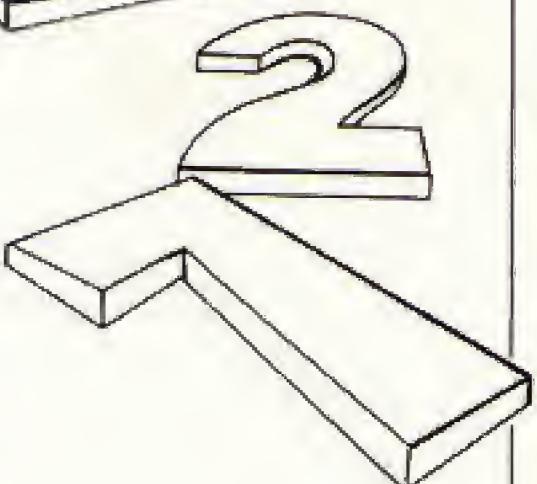
Using longer, more appropriate names can really make a difference to understanding how programs work.

Have a look at this:

```
10 REM PROGRAM VI
20 W=10
30 H=20
40 A=W*H
50 PRINT A
```

This prints out the area of a rectangle of width 10 and height 20. Program VII does exactly the same thing but it is much more easily understood from its listing:

```
10 REM PROGRAM VII
20 width=10
30 height=20
40 area=width*height
50 PRINT area
```



You'll notice I have used meaningful variable names and that they are in lower case letters. The names are in small letters for two reasons.

The first is so that there is no inadvertent clash between a variable name and a Basic keyword, of which more later.

Since Basic keywords must always be in capital letters, so using lower case variable names avoids this problem.

The second reason is that the variable names stand out in the listings, separated from the Basic keywords which have capital letters.

It may not help the Electron, but it does help you and

From Page 11

anyone who may be reading your listings.

Let's take a brief look at the rules for variable names shown in Table 1.

The first says that there must not be any spaces in the name. If you decide to use a variable name with a space in the middle, you'll get an error message.

If you must have a gap, then use the underline character which you'll find on the same key as the down cursor.

And don't use the hyphen instead of the underline. You aren't allowed to use punctuation marks or mathematical symbols in variable names. Nor can they start with a number.

Finally, as we said above, a variable name can't begin with a Basic keyword. A variable *LETTER* would cause the Electron confusion with the

RULE	WRONG	RIGHT
No spaces in variable name Must not start with number No punctuation marks in name No arithmetic operators included in name Must not begin with a Basic keyword	sleeping dogs = 3 2nd time = 35 peter's = 9 night+day = 24 LETTERS = "a"	sleeping_dogs = 3 secondtime = 35 peters = 9 nightandday = 24 letterS = "a"

Table 1: Rules for naming variables

Basic keyword *LET*. It would be better to use *letter*.

It seems like a lot of rules at first, but they'll soon become second nature, and the Electron will always tell you when you've got it wrong.

Using meaningful names really helps you to better programming and it's a habit worth getting into.

And that's it for this month. We've covered giving labels to numbers (numeric variables)

and had a closer look at what *LET* does.

We've seen that we don't have to type in *LET* — the Electron will assume it.

Finally we've learnt the rules for naming variables, both numeric and string.

Next month we'll be looking at how to give values to variables while the program is still running.

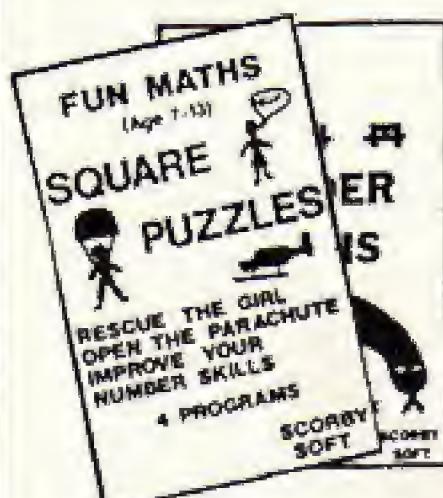
Until then have a look at Program VIII. Can you guess

what value *total* will have when it's displayed by the *PRINT* command of the last line?

Do you understand what's happening?

```
10 REM PROGRAM VIII
20 total=1
30 total=total+1
40 total=total+total
50 total=total+1
60 PRINT total
```

SCORBY SOFT EDUCATIONAL SOFTWARE FUN MATHS (Ages 7-13)



Two full-graphics packages designed to improve mental number work and logical thought skills. All programs are fun to use and are proving very successful in speeding-up logical thought and mental arithmetic. BBC versions of the same programs are used in schools.

- **SQUARE PUZZLES**
(4 programs) £6
- **INVADER MATHS**
(2 programs) £4
(Buy both for £8.50)

INFORMATION HANDLING

A two-cassette package of programs and data-bases to introduce you to the world of information technology. Use large data-bases, create and use cassette files, produce your own electronic dictionary. Features 19th century population survey with full documentation on how to computerise similar information for your own area. This package has been written for new computer users or anyone who wants an introduction to information handling.

£11.50

Cheques etc. to:

SCORBY SOFTWARE,
Main St., Flixton, Scarborough, YO11 3UB



QUALITY EDUCATIONAL SOFTWARE

PLAYBOX

BBC MICRO B/ACORN ELECTRON

A series of three programs that will provide hours of fun for all the family.

MEMORY is a game for two players, where the computer displays a series of pictures which must be paired off.

HANGMAN has a vocabulary of 280 words and a facility to define your own words. Categories include countries, animals, birds, world capitals and others, for age seven upwards.

BRICKSMASH traps you behind a red brick wall. Answer the general knowledge questions correctly to break down the wall and escape.

All programs are very user-friendly with full colour graphics and high quality sound. All three programs are available on one cassette for £6.50 incl. Also available on 40 Track disc for £8.50.

AVAILABLE BY MAIL ORDER OR FROM GOOD COMPUTER OUTLETS.

PLEASE STATE WHICH COMPUTER WHEN ORDERING.

COMSOFT COMPUTER SOFTWARE
7 ROMAN DRIVE
LEEDS
WEST YORKSHIRE

GUARANTEED
48 HR DESPATCH

TRADE ENQUIRIES WELCOME. TEL 0632 665621

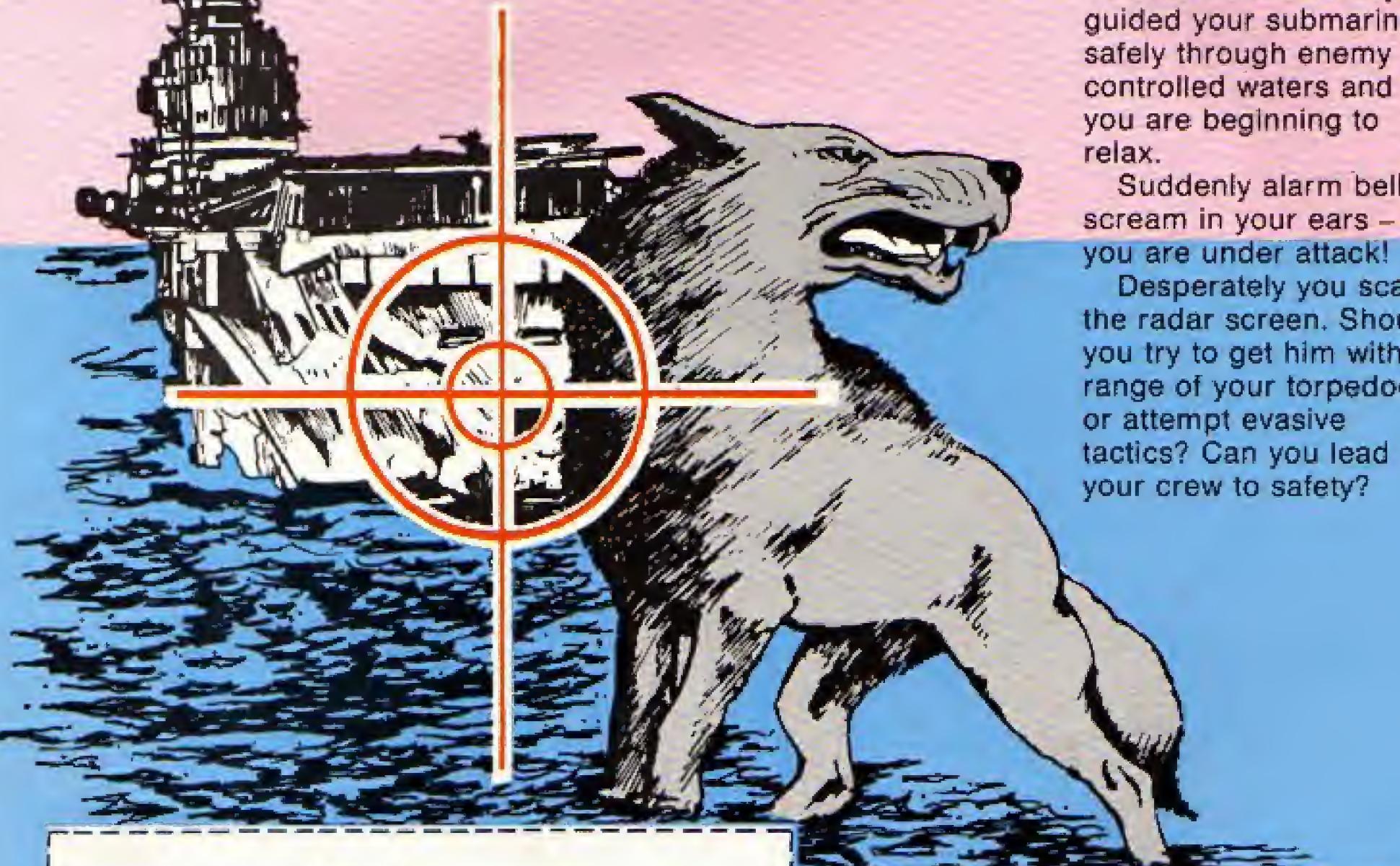


OPTIMA SOFTWARE

+



Sea Wolf



So far all has gone well. You have successfully guided your submarine safely through enemy controlled waters and you are beginning to relax.

Suddenly alarm bells scream in your ears – you are under attack!

Desperately you scan the radar screen. Should you try to get him within range of your torpedoes, or attempt evasive tactics? Can you lead your crew to safety?

ORDER FORM

Please send me SEA WOLF:

- BBC 'B' cassette - £6.95
- Electron cassette - £6.95

Add 50p p&p
(post free 2 or more)

Name

Address

.....

.....

I enclose cheque made payable to Optima Software Ltd.

I wish to pay by No.

Access Visa

Expiry date

Optima Software Ltd., 36 St. Petersgate, Stockport SK1 1HL.

Software. With a touch of brilliance

NIGEL PETERS investigates the use of graphics windows to enhance your program displays

THIS month we'll be having a close look at Message, a program that Andrew Waite tells me he used to send a greetings message to his uncle.

It's a very simple but also very effective program as you'll see if you type in the listing and run it.

The secret lies in its use of something called the graphics window – a piece of the screen set aside for graphics displays.

The only thing you have to know to understand Message is that you define a graphics window with a VDU24 command.

Of course you have to be in a graphics mode to do it – it won't work in Modes 3 and 6.

This VDU24 is followed by the coordinates of the bottom left hand corner of the graphics window, then those of the top left hand corner.

To get the coordinates you must know that the TV screen is divided into a lot of imaginary points. There are

Send your message through a window!

1280 of them going from left to right and 1024 from bottom to top, as you'll see in Figure I.

You can refer to any point on the screen using two coordinates. The bottom left of the screen is 0,0, and the top left is 0,1023.

The top right is 1279,1023 and the bottom right is 0,1279.

Usually the graphics screen fills the whole of the screen, but we can change this with the VDU 24.

To achieve the graphics screen that I've coloured red in

Figure II all we do is put the Electron in a graphics mode, say Mode 5, type in:

VDU 24,40;40;1239;983;

and press Return. Don't forget the semi-colons, they're vital.

Nothing much appears to happen, but let's type in:

GCOL 0,129

and press Return.

Now we'll use CLG to clear the graphics screen we've defined with our original VDU 24 and see what happens. Type in:

CLG

and press Return. We get a red rectangle.

This is our graphics window. The GCOL changed the background colour to red and when we cleared the graphics window with CLG the window turned to red.

Now let's define another graphics window just inside the first using:

VDU 24,80;20;1199;943;

and change the background colour to yellow using:

GCOL 0,130

Now entering CLG will

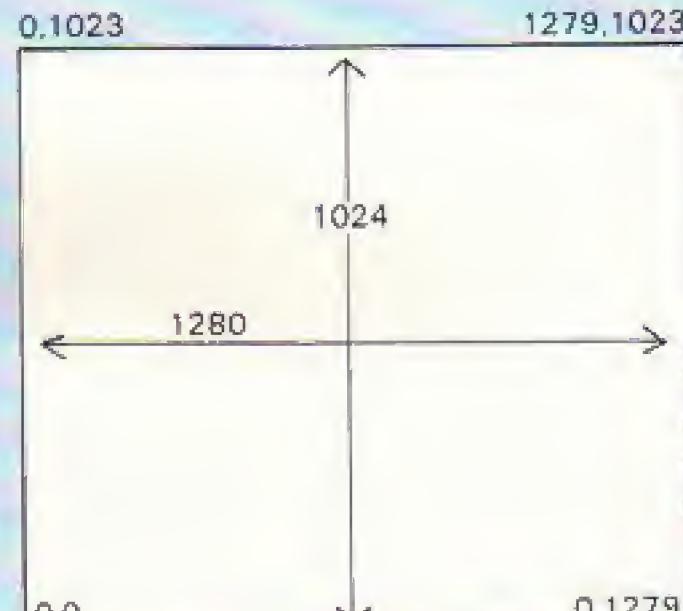


Figure I

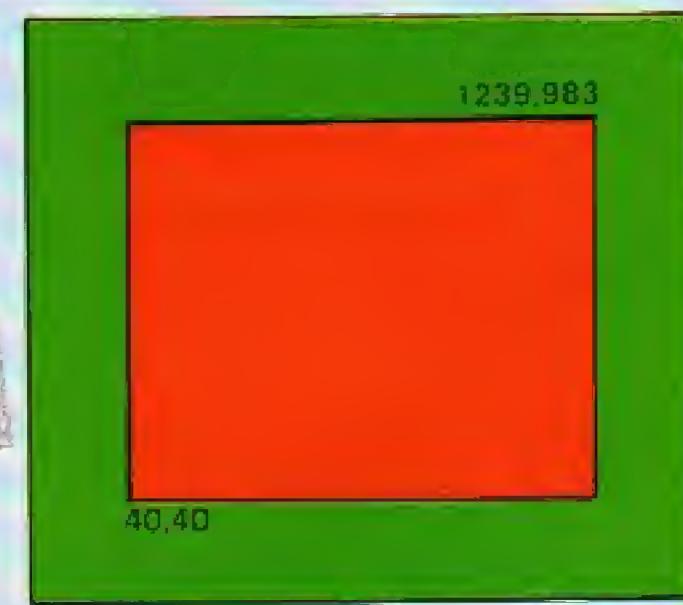


Figure II



produce a yellow rectangle just inside the first.

We've cleared the new graphics window to the new background colour yellow. But it has left the bits outside the new window in the old colour red. Figure III shows what has happened.

Have a go at producing a few different graphics windows. It's a great way of producing fast rectangles and is the technique that Andrew has used to send his message.

The first two lines of the program are REM statements that give information to us humans but not to the Electron.

Lines 30 and 240 form a REPEAT...UNTIL loop that runs the lines that come between them over and over again, endlessly.

Line 230 puts a kind of break on this, holding up the program until a key is pressed. This just allows you to see the message again and again.

Line 40 puts the Electron in Mode 1, as you might have guessed. This is a four colour

graphics mode.

The VDU23 on the next line just switches off the flashing cursor.

Lines 60 to 100 set up the five main variables of the program, while line 110 does the main work.

This defines a graphics window.

Where the window actually is depends of the value of *A*, *B*, and *C* when the program executes this line. It does this more than once, as we'll see later.

Line 120 then uses the value that it finds in the variable *D* to alter the background colour of the graphics window and the next line clears the new window to that colour.

Line 140 just makes a beep every time the program comes to it, the pitch depending on the value of the variable *E*.

Lines 150 to 170 alter the values placed in the variables that we've previously used to define the graphics window.

This has the effect of moving the window inwards

next time it is defined — see Figure IV.

Line 180 alters the variable that decides the background colour, making sure that it always contrasts with the previous colour.

Line 190 increases the value of *E*.

Line 200 is a powerful one. When the program is run, it sets up a graphics window, then alters all the variables, and then comes to line 200.

If the value of *A* is less than 760 then the program has to go back to line 110 and repeat the whole process over again with the newly altered variables.

This has the effect of displaying a new graphics window and changing the variables again.

If *A* is still less than 760 when the program gets to line 200, it goes back to line 110 and starts all over again creating yet another graphics window inside the others.

That's how we produce all those nice boxes on the screen.

When *A* is equal to 760, or greater than it, the program doesn't have to go back to line 110 as the condition of the GOTO has been fulfilled.

It then goes on to obey lines 210 and 220 and print the message in the centre of the screen. We've congratulated Andrew on his program. You could, if you wish, insert your own messages.

And that's it. Simple, when you know how. Yet very effective indeed. Nice one, Andrew.

```

10 REM BY ANDREW WAITE
20 REM (C) ELECTRON USER
30 REPEAT
40 MODE 1
50 VDU 23,1,0;0;0;0;

60 A=0
70 B=1279
80 C=1023
90 D=129
100 E=0
110 VDU 24,A;A;B;C;
120 GCOL 0,0
130 CLG
140 SOUND 1,-15,E,1
150 A=A+20
160 B=B-20
170 C=C-20
180 D=D+2
190 E=E+40
200 IF A<760
     THEN GOTO 110
210 PRINT TAB(15,15);"
     NICE ONE "
220 PRINT TAB(15,16);"
     ANDREW "
230 WAIT$=GET$
240 UNTIL FALSE

```

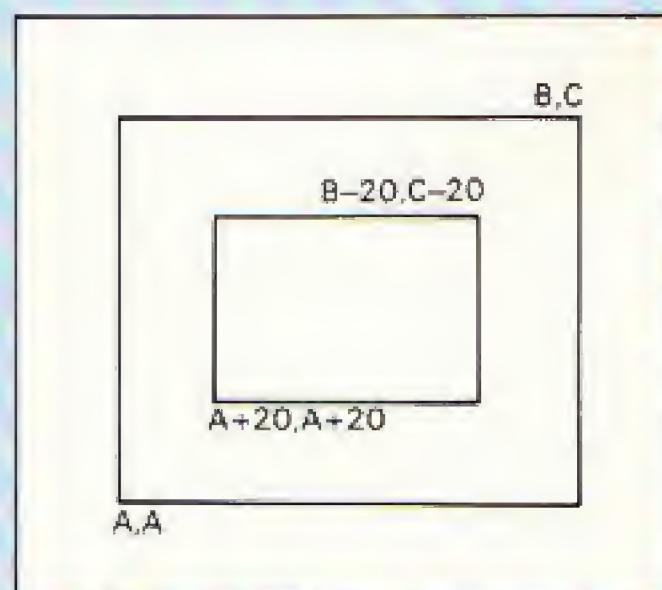
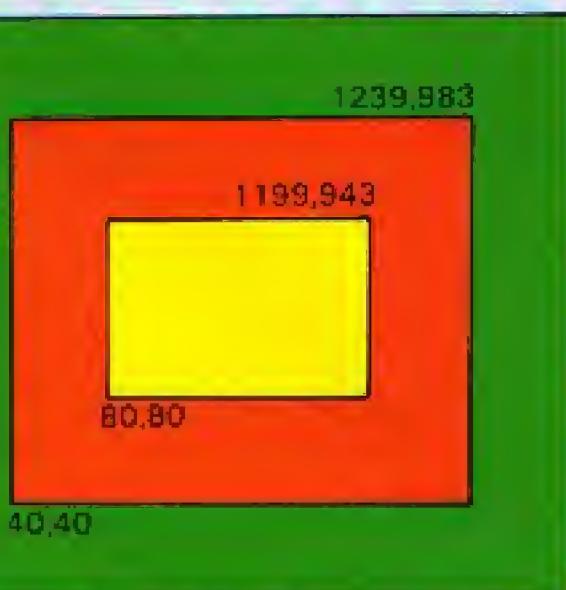


Figure III

Figure IV



1 year
GUARANTEE
on all our
products

BARGAIN OF THE MONTH

WORD HANG (BES)

An educational version of the popular hangman game.

Special price valid to May 31, 1984 £7.97

ALL PRICES INCLUDE VAT

**How to get
a generous
discount on
all your purchases!**



WHAT YOU DO

Either purchase three items of software for the price of two (lowest priced item free) or make purchases to the value of £100 or more.

WHAT YOU SAVE

1. All subsequent purchases totalling over £25 are eligible for discount* of:
 - 10% on software • 5% on hardware when you quote your membership number.
2. If you buy at least one item of software every month you get 10% discount on all such purchases. Ask for a registration card to take advantage of this scheme.
3. The opportunity to enter the members' competitions run throughout the year. Just ask for competition entry form when you send in your order.

Ask for an application form at any of our outlets or write for a form to:

National Micro Centres Computer Club,
36-38 St Petersgate,
Stockport SK1 1LH.

*Discount only applies to our normal prices and not to any special offer prices which may be in force for the time being.

National Micro

Our top best-sellers

Birds of Prey (Romik)
A fast moving invaders type game where the aliens in space take the form of birds. Good value for money. £6.99

Chuckle Egg (A & F)
Just when you thought it was safe to go back on the farm this game makes you think again. The idea is to collect eggs before storks devour corn or you. A progressive game requiring extremely high skill levels. The nightmare has begun! £7.90

Killer Gorilla (Micropower)
Fast becoming a cult game. Dodge tumbling barrels and blazing fireballs as you battle to rescue the damsel in distress. Gripping multi-level action. £7.95

Twin Kingdom Valley (Bug-Byte)
Not only a good adventure but all 175 locations are drawn in full-screen hi-res graphics. A sophisticated adventure game. £9.50

Cylon Attack (A & F)
"Outstanding... quite simply excellent... the graphics leave most other games standing". - Micro User. £7.90

GAMES

A & F				
Cylon Attack	.....	£7.90		£12.65
Chuckle Egg	.....	£7.90		£12.65
Acornsoft				
Draughts	.....	£9.20		£12.65
Meteors	.....	£9.20		£12.65
Snapper	.....	£9.20		£12.65
Starship Command	.....	£9.20		£12.65
Chess	.....	£9.20		£12.65
Forth	.....	£16.10		£12.65
Graphs & Charts	.....	£9.20		£12.65
Lisp	.....	£16.10		£12.65
Monsters	.....	£9.20		£12.65
Alligata				
Bugblaster	.....	£7.95		£12.65
Lunar Rescue	.....	£7.95		£12.65
Fruit Machine	.....	£5.95		£12.65
Bug-Byte				
Twin Kingdom Valley	.....	£9.50		£12.65
Dr. Soft				
747 Simulator	.....	£7.95		£12.65
Digital Fantasia				
10 Little Indians	.....	£10.29		£12.65
Arrow of Death Part 1	.....	£10.29		£12.65
Arrow of Death Part 2	.....	£10.29		£12.65
Circus	.....	£10.29		£12.65
Escape From Pulsar 7	.....	£10.29		£12.65
Feasibility Experiment	.....	£10.29		£12.65
Golden Baton	.....	£10.29		£12.65
Persus Andromeda	.....	£10.29		£12.65
Time Machine	.....	£10.29		£12.65
Wizard of Akyrtz	.....	£10.29		£12.65
Ivan Berg				
... I Do	.....	£12.65		£12.65
Crime and Detection Quiz	.....	£12.65		£12.65
History Quiz	.....	£12.65		£12.65
Micropower				
Adventure	.....	£7.95		£12.65
Bandits at 3 o'Clock	.....	£7.95		£12.65
Croaker	.....	£7.95		£12.65
Cybertron Mission	.....	£7.95		£12.65
Danger UXB	.....	£7.95		£12.65
Escape from Moonbase Alpha	.....	£7.95		£12.65
Felix & The Fruit Monster	.....	£7.95		£12.65
Felix In The Factory	.....	£7.95		£12.65
Galactic Commander	.....	£7.95		£12.65
Intergalactic Trader	.....	£7.95		£12.65
Killer Gorilla	.....	£7.95		£12.65
Moon Raider	.....	£7.95		£12.65
Nemesis	.....	£7.95		£12.65
Positron	.....	£7.95		£12.65
Swoop	.....	£7.95		£12.65
Optima				
Seawolf	.....	£6.95		£12.65
Bed Bugs	.....	£6.95		£12.65
Romik				
Alien Break-In	.....	£7.95		£12.65
Atom Smasher	.....	£7.95		£12.65
Birds Of Prey	.....	£6.99		£12.65
Superior Software				
Centibug	.....	£7.95		£12.65
Alien Dropout	.....	£7.95		£12.65
Invaders	.....	£7.95		£12.65
World Geography	.....	£7.95		£12.65
Fruit Machine	.....	£7.95		£12.65
Constellation	.....	£7.95		£12.65

Enjoy the thrills and spills of this exciting rally driving game by ERIC

DRIVE INTO DANGER!

HAVE you ever fancied having a go at being a rally driver? Well, with Rally Driver you can turn your Electron into a driving simulator and try to steer your way round a course in the fastest time possible.

It's just like the real thing. You can steer from left to right, accelerate, brake and — if you're not careful — crash.

All the instructions are in the program. The rest is up to you.

Drive carefully!



10 REM RALLY DRIVE (C)

ELECTRON USER by
Eric H. Crisp

20 MODE 6

:PROCInstruct
:MODE 5

30 REPEAT

40 PROCInitial

50 REPEAT

60 PROCRoad.

:PROCKeys

:PROCTest

70 UNTIL FX

80 MODE 6

:PROCResult

:MODE 5

90 UNTIL FALSE

100 DEF PROCCalc

110 UI(P1)=(CPI-II(P1))/(PI
+1)

120 LI(P1)=UI(P1)-2*(896-VI
(PI))

130 RI(P1)=UI(P1)+2*(896-VI
(PI))

140 ENDPROC

200 DEF PROCDraw

210 6COL 3,3

:VI=VI(P1)
:WI=VI(P1+1)

220 VDU 25,4,UI(P1);VI;25

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are given on Page 4 of the February issue.

,5,(UI(P1+1)+U2(P1))
DIV 2; (VI+WI)DIV 2;
240 VDU 25,4,R1(P1);VI;25
,5,R1(P1+1);WI;25
,4,L1(P1);VI;25,5
,L1(P1+1);WI;
250 ENDPROC
300 DEF PROCInitial
310 CSI=0
:CYZ=0
:CPI=320
:CI=0
:LI=0
:PPI=0
:DI=0
:FI=0
320 FOR PI=0TO 6
:II(P1)=0
:VI(P1)=896-640
DIV (PI+1)
:PROCCalc
:NEXT
330 TIME =0
:COLOUR 129
:ZI=6
:VDU 29,640;160;23;8202
;0;0;0;
340 FOR PI=0TO 4
:PROCDraw
:NEXT
350 VDU 18,0,1,25,4,-640;-1
60;25,4,-640;160;25
,85,640;-160;25,85
,640;160;
360 VDU 18,0,2,25,4,560;210
;25,85,640;-4;25,85
,530;224;25,85,530;20;2
5,85,500;234;25,85
,470;224;25,85,530;20;2
5,85,440;200;
370 VDU 25,85,320;44;25
,85,320;224;25,85
,160;64;25,85,160;244;2
5,85,0;76;25,85,0;256;2
5,85,-160;64;25,85
,-160;244;25,85,-320;44
;25,85,-320;224;25
,85,-530;20;25,85
,-440;200;
380 VDU 25,85,-640;-4;25
,85,-470;224;25,85
,-640;160;25,85,-500;23
4;25,85,-560;210;25
,85,-530;224;18,0
,0,25,4,-530;20;25
,29,-440;192;25,4
,530;20;25,29,440;192;
390 COLOUR 0
:PRINT TAB(3,27) "SPEED"
TAB(13,27) "TIME"
:COLOUR 3
:ENDPROC
400 DEF PROCInstruct
410 DIM XZ(10),VZ(10)
,UI(10),LZ(10),RZ(10)
420 PRINT TAB(13,21) "RALLY
DRIVER" TAB(13,3) *****

430 PRINT TAB(6,5) "You
are on a timed section
of a ***rally. You
can incur penalty
points for driving
on the verge or the
wrong side of the
road. A crash scores

	PROCEDURES
Line Proc	Calculates the screen positions of the road
100 Calc	sections on the screen.
200 Draw	Draws a road section.
300 Initial	Initialises variables and the screen for a new game.
400 Instruct	Dimensions arrays and displays the instructions.
500 Keys	Reads the keyboard and adjusts variables accordingly, makes the sound and displays the time and speed.
600 Result	Displays the result at the end.
700 Road	Displays the road in the new position.
800 Test	Tests for position on the road and displays the relevant comment.

VARIABLES

	VARIABLES
C%	Curve sharpness.
CP%	Car's absolute position, horizontally.
CS%	Car's steering speed.
CY%	Car's forward speed.
D%	Distance travelled.
F%	Finished flag.
L%	Length of curve.
P%	Road section counter - proportional to distance in front of car.
PP%	Penalty points.
T%	Time delay.
V%	A particular $V\%(P\%)$ value.
W%	A particular $V\%(P\%)$ value.

CHANGES

CHANGES
To extend the game, line 810 can be changed by increasing the value with which D% is compared, so making a longer rally.

The curvature of the bands can be increased by increasing the random value assigned to C% at the end of line 750. To keep left and right bends equal, the first number should be twice the second number. The length of the bands can be increased by increasing C%.

The length of the bends can be increased by increasing the random value assigned to $L\%$.

ARRAYS

	ARRAYS
L%(P%)	Screen x coordinate of section P% of the left verge.
R%(P%)	Screen x coordinate of section P% of the right verge.
U%(P%)	Screen x coordinate of section P% of the white line.
V%(P%)	Screen y coordinate of section P% of the road.
X%(P%)	Absolute x coordinate of section P% of the white line.

```

nothing."
440 PRINT TAB(6,12) "The
    controls are as follow
s." ''SPC (12) "A ....
    Accelerator"SPC (22)
    "2 .... Brake"SPC (28)
    "< .... Left"SPC (29)
    "> .... Right"
450 PRINT TAB(8,20) "PRESS
    SPACE TO DRIVE OFF"
460 $FX15.0
470 REPEAT UNTIL GET =32
480 ENDPROC
500 DEF PROCKeys
510 CYI=CYI-4000*INKEY (-66
    )+7000*INKEY (-98)-500
520 IF CYI<500
    THEN CYI=500
    ELSE IF CYI>40000
    THEN CYI=40000
530 TI=TIME +200-SQR (CYI)
    :DZ=DZ+1
    :SOUND 17,1,CYI
    DIV 800,255
    :ENVELOPE 1,40020
    DIV (CYI+20),4,-2
    ,0,1,2,1,126,0,0,-126
    ,126,0
540 REPEAT
550 CSZ=CSZ-INKEY (-103)+
```

```

INKEY (-104)
:PRINT TAB(0,28)CYI
DIV 500TAB(10,28)
TIME DIV 100
560 IF CSI>10
  THEN CSI=10
  ELSE IF CSI<-10
  THEN CSI=-10
570 UNTIL T<TIME
580 CPI=CPI+(CYI*CSI)
  DIV 4000
590 ENDPROC
600 DEF PROCResult
610 IF FI=1
  THEN PRINT TAB(7,5)
  "You travelled ";DI
  DIV 10;".";DIMOD 10;
  " miles before ""you
  CRASHED!"""
  You also managed to
  incur ";PP1; "penal
  points."
620 IF FI=2
  THEN PRINT TAB(5,5)
  "WELL DONE! You took
  ";TIME DIV 100; " se
  nds""but incurred ";
  ";PP2; "penalty points."
  " Your score is
  ";1000-PP2-TIME

```

```

DIV 50
630 PRINT TAB(5,20)*PRESS
      SPACE TO DRIVE AGAIN*
640 :FX15.0
650 REPEAT UNTIL GET =32
660 ENDPROC
700 DEF PROCRead
710 PI=0
      :PROCDraw
      :XZ(PI)=XZ(PI+1)
      :PROCCalc
      :PI=1
720 REPEAT
730 IF PI<>5
      THEN PROCDraw
740 XZ(PI)=XZ(PI+1)
      :PROCCalc
      :PI=PI-1
      :PROCDraw
      :PI=PI+2
750 IF PI=5
      THEN L1=L1-1
      :XZ(6)=XZ(5)+C1
      :IF L1<=0
      THEN L1=RND(20)
      :C1=(RND(201)-101)
760 UNTIL PI>5
770 ENDPROC
800 DEF PROCTest
810 IF DZ>100

```

```

THEN PI=2
:ENDPROC
820 IF UX(0)>1600OR UX(0)<-1600
THEN PI=1
:PPI=PPI+100
:SOUND 16,-15,4,50
:FOR PI=0TO 500
:VDU 19,1,PI;0;19
,2,PI+210;
:NEXT
:ENDPROC
830 IF UX(0)>9600OR UX(0)<-60
THEN PPI=PPI+15
:PRINT TAB(4,30)*"ON
THE VERGE";
:ENDPROC
840 IF UX(0)<320
THEN PPI=PPI+5
:PRINT TAB(4,30)*"WRONG
SIDE ";
:ENDPROC
850 PRINT TAB(4,30)*
"";
:ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 47.

Notebook Part 4

Figure it out

MANDALA is an elementary but very effective program that draws a pattern of fine lines on the screen of your Electron.

The program itself is simple, with only nine active lines. But the logic behind it isn't trivial.

Try working it out with pencil and paper and you'll soon see the pattern emerging.

```
10 REM MANDALA
20 REM NIGEL PETERS
30 MODE 1
40 GCOL 0,1
50 MOVE 500,500
60 FOR X=0 TO 500 STEP 32
70 DRAW 500,1000-X
80 DRAW 500-X,500
90 DRAW 500,X
100 DRAW 500+X,500
110 NEXT
```

10,20 REM statements

30 Choice of mode

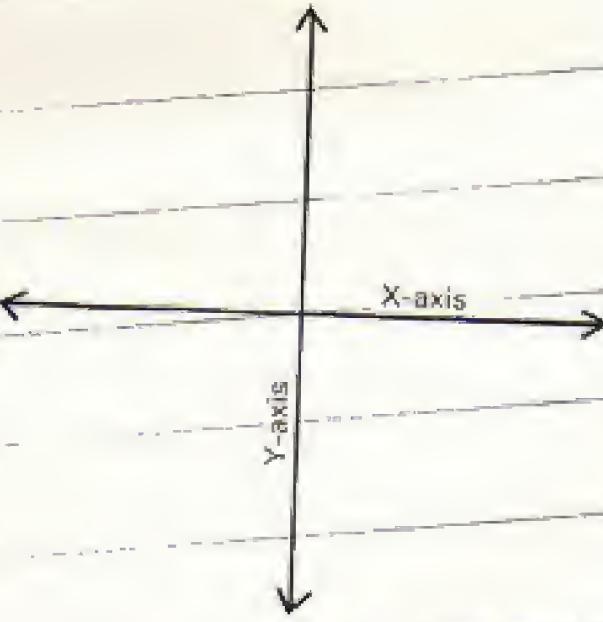
40 Choice of colour

50 Graphics cursor instruction

60,110 FOR...NEXT loop

Position of lines to be drawn

- 10-20 The usual REM statements giving information about the program to humans but not to the Electron.
- 30 Puts the Electron into Mode 1, allowing fine lines to be drawn. Try out other modes. GCOL 0,1 chooses red as the colour the lines will be drawn in. Try using 2 or 3 instead of 1. Why don't you use 0, the other logical colour available in this mode?
- 50 Moves the graphics cursor to point 500,500. The drawing starts here.
- 60-110 These lines define a FOR... NEXT loop which draws the pattern. Each time round the loop, four lines are drawn, the changing values of X changing the positions of the lines.
- 70 Draws a line to the point defined. Each time round the loop the point will move down from the top of the screen along the Y-axis.
- 80 Draws lines from the last point to a point that moves out to the left along the X-axis each time round.
- 90 Draws lines to a point moving upwards each time along the Y-axis.
- 100 Draws lines to a point moving out along the X-axis each time round the loop.



Trevor Roberts

Examples of
mandala figures

ELECTRON USER...

...this is the add-on you have
been waiting for.

A switched joystick interface
for the Electron user.

Only £24.95 incl. VAT

- Compatible with all "Atari-style" 9-pin joysticks
- Plug in cartridge design
- Tough plastic casing
- Does not interfere with keyboard operation
- Available from your dealer or direct by mail order
- 12 month guarantee
- Games coming soon from most software houses
- Extends the versatility of your Electron computer



STOP PRESS - Now available
for use with our interface
"Cylon Attack" by A&F Software



A Genuine First Byte Add-on

First Byte, Dept. EU.
10, Castlefields,
Main Centre, Derby.
DE1 2PE Tel: Derby
(0332) 365280

Please send me MAIL ORDER FORM
I enclose a cheque/made payable to First Byte S.J. Interface
I wish to pay by Access Visa
Expiry date
Name
Address
Tel.

'TOP SECRET'

Send secret messages with the help of PETE DAVIDSON's coding program

MAIN PROCEDURES

PROCINIT: Reads the password. Change it in the last line of the program if you wish.

PROCIDENTIFY: Lets you enter the password, and checks it against the password in memory. If it is wrong three times, the program falls into an endless loop at line 350. Once you have the program working you can make it more secure against unauthorised use by inserting two more lines:

```
5 *FI200,3
5 ON ERROR GOTO 350
```

Line 5 causes memory to be wiped when Break is pressed (so that no one can list your password). Line 6 will put the program in an endless loop if escape is pressed.

Note that you must never put lines like this into any program unless it is saved on tape, and you are sure that it is error free.

PROCNMBER: This takes in your code

THIS program is intended to be used by secret agents to send messages to other agents. Or, alternatively, from one Electron user to another.

number and checks that it is valid. If it is you proceed. If it's not, PROCINVALID is called.

PROCINVALID: Prints out how you can create a valid code number if you type in an invalid one. It also gives you some examples to use if you cannot create your own.

PROCTYPEIN: The input procedure. The message (whether coded or not) is returned as MESSAGE\$.

PROCCODE: This allows you to type your message in (using PROCTYPEIN). It then converts it first to CODE\$ (by rearranging the blocks of five letters) and then to FINALCODES (by adding a number to the Ascii code of the letters). The procedure then gives you the option to save your code on tape.

PROCDECODE: This reads FINALCODE\$ from tape, or uses PROCTYPEIN to obtain the coded message as MESSAGE\$ from the keyboard and then calls it FINALCODES.

The messages can be sent as coded writing, or as a coded message on tape. Either way it will be difficult for anyone without the correct code number to decode it.

To prevent unauthorised use of the program you have to enter a password before you can use it.

The password does not appear on the screen, so no one can read it over your shoulder.

The password we use here is ELECTRON. But it is easily changed by altering the last line of the program.

You then enter the code number. The way the message is coded depends on this number.

Either read and understand how the number works (below) or type any number. If it is not valid the computer will give you some suitable suggestions.

Remember the number! You cannot decode your message without it.

The message is split into groups of five letters. The first five numbers of the code number are used to determine the order that the letters are placed within the group.

For example, ABCDE becomes ACDBE using 13425 as the first part of the code number.

The sixth number in the code number determines how many are added to the Ascii value of each letter.



For example, if this number is 2, any As in the code become Cs.

All the above means that the code number must be six numbers long, and consist of the numbers 1 to 5 in some order, followed by a number between 1 to 4. Here are some example code numbers, and a sample of how they would code ABCDEFGHIJ:

- 123450 would leave the message uncoded.
- 123451 would change ABCDEFGHIJ to BCDEFGHIJK.
- 543210 would change ABCDEFGHIJ to EDCBAJIHGF.
- 543211 would change ABCDEFGHIJ to FEDCBKJHIG.

There are 600 possible code numbers, ranging from uncoded to difficult to decode.

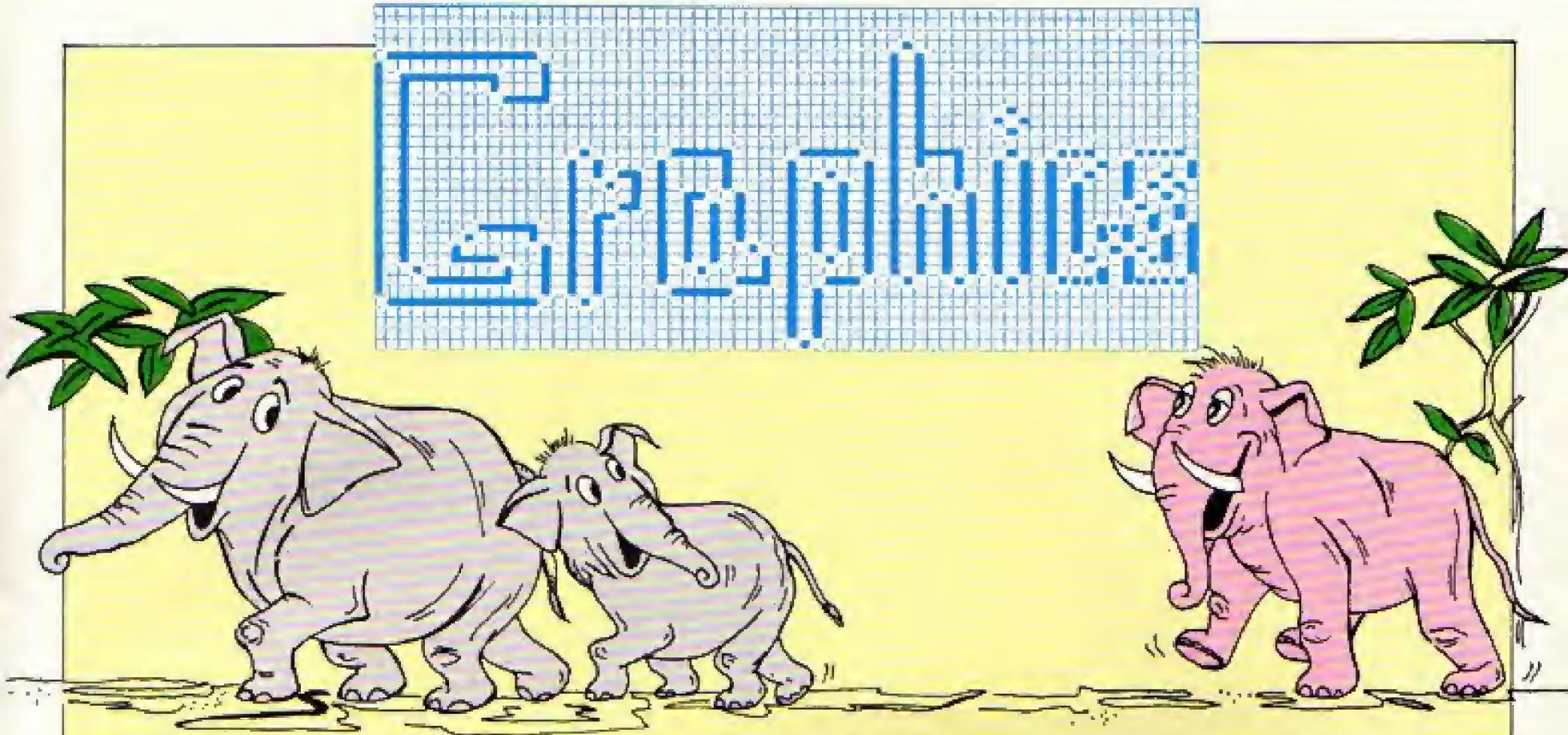
```
10 REM EDDIE'S CODING PROGRAM
20 REM (c) ELECTRON USER
30 REM BY PETE DAVIDSON
40 MODE 6
:VDU 23;8202;0;0;0;
50 PROCINIT
60 PROCIDENTIFY
70 PROCNMBER
80 CLS
:VDU 7
:INPUT "Do you want
```

```
to code or decode? "TASK
:
90 IF TASK$="CODE" OR TASK$=
"code"PROCCODE
ELSE IF TASK$="DECODE"
OR TASK$="decode"
PROCDECODE
ELSE GOTO 80
100 VDU 7
:PRINT "Do you want
to use the program again
```

```
?"
:ANSWER$=GET$
110 IF ANSWER$="N" CLS
:END
ELSE IF ANSWER$>"Y"
THEN 100
120 VDU 7
:CLS
:PRINT "Do you want
to use the same code
```

```
number?"
:ANSWER$=GET$
130 IF ANSWER$="Y"
THEN 80
ELSE IF ANSWER$="N"
THEN 70
ELSE 130
140 END
150
```

Turn to Page 60



You don't need to stick with just black and white in the two-colour modes. MIKE McMANUS encourages you to ...

Change your colour codes!

LAST month we looked at how we could get more colour on the TV screen. We looked at the COLOUR command in particular and saw how it could be used to produce multicoloured text in Modes 1, 2 and 4.

We found that in these modes we didn't have to be stuck with the dreary old black and white default colours but could use code numbers after the COLOUR command to pick other text colours.

However we didn't do anything about the two-colour modes - 0, 3, 4 and 6.

We know from our experience with Mode 2 that we can get 16 colours on the screen, eight of them flashing.

Is it possible to have some

of the more interesting colours such as, say, blue and yellow, rather than the black and white of a two-colour mode?

The answer is yes. You can choose different colours for the two-colour modes.

To do it you use the VDU19 command. This tells the Electron's operating system that you want to change the colours that are appearing on the screen.

Before we go into that, though, let's just have a look at the colours and colour codes in Mode 6.

Anything we say about this mode will apply equally as well to the other two-colour modes we've mentioned.

We know that Mode 6 is a two-colour mode. When we enter it we have two colours, white letters on a black background.

A glance at Figure 1 - which should be familiar from the last article - shows that the colour code number, or more formally, the logical colour number, is 0 for black and 1 for white.

If we were daft enough we could use these colour code numbers to give us black text on a black background.

Entering:

COLOUR 0

and pressing the Return key will have this effect. We could now get a white background by entering:

COLOUR 129

if only we could see what we're doing.

From all that you should see that the COLOUR command, coupled with the appropriate code number, allows us to mess about with the screen.

However as we only have two colour codes available in the two-colour modes, the scope isn't as great as in the other modes. We're stuck with 1 and 0.

But wouldn't it be nice if, instead of the 0 being the code for black, it could be the code for blue? And wouldn't it be good if the 1 that was the code for white could be made to represent, say, yellow?

Not only would it be nice, it's also very easy to do!

The point to grasp is that although you can only have two colours on the screen at any one time in a two-colour mode, they can be any of the 16 colours that the Electron can produce.

We came across the 16 - eight steady colours and eight flashing ones - last month.

Well, you can't have all 16 on the screen at once in Mode

MODES 0, 3, 4, 6

Logical number	Colour
Foreground	Background
0	128
1	129

(on entering mode)

MODES 1, 5

Logical number	Colour
Foreground	Background
0	128
1	129
2	130
3	131

(on entering mode)

The logical colour numbers on entering mode 2 are also the actual colour numbers

MODE 2 (and actual colours)

Logical number	Colour
Foreground	Background
0	128
1	129
2	130
3	131
4	132
5	133
6	134
7	135
8	136
9	137
10	138
11	139
12	140
13	141
14	142
15	143

(on entering mode)

Figure 1

Make light work of listings!

To save your fingers most of the listings in *Electron User* have been put on tape. Five are now available — for the February, March, April and May issues, plus a bumper tape of all the programs from the first four introductory issues.

On the May tape:

RALLY DRIVER High speed car control. **SPACE PODS** More aliens to annihilate. **CODER** Secret messages made simple. **FRUIT MACHINE** Spin the wheels to win. **CHASER** Avoid your opponent to survive. **TIC-TAC-TOE** Electron noughts and crosses. **ELECTRON DRAUGHTSMAN** Create and save Electron masterpieces. **SHEEP** A program for insomniacs. **MATHS HIKE** Mental arithmetic on the move. **MESSAGE** VDU commands in action. **ROTATION** and **STAR** Two graphics demonstrations. **MANDALA** The Notebook program. **PLUS LOTS, LOTS MORE.**

On the April tape:

SPACEHIKE A hopping arcade classic. **FRIEZE** Electron wallpaper. **PELICAN** Cross roads safely. **CHESTIMER** Clock your moves. **ASTEROID** Space is a minefield. **LIMERICK** Automatic rhymes. **ROMAN** Numbers in the ancient way. **BUNNYBLITZ** The Easter program. **DOGDUCK** The classic logic game. **NOTEBOOK** Coloured grids. **BINARY** A base program.

On the March tape:

CHICKEN Let dangerous drivers test your nerve. **COFFEE** A tantalising word game from Down Under. **PARKY'S PERIL** Parky's lost in an invisible maze. **REACTION TIMER** How fast are you? **BRAINTEASER** A puzzling program. **COUNTER** Mental arithmetic can be fun! **PAPER, SCISSORS, STONE** Out-guess your Electron. **CHARACTER GENERATOR** Create shapes with this utility. **FUNNY POLYGONS** Fast graphics going round in circles. **RABBITS** Easter bunnies all over! **DRAW** Multi-coloured lines. **MEAN** Just an average program.

On the February tape:

NUMBER BALANCE Test your powers of mental arithmetic. **CALCULATOR** Make your Electron a calculator. **DOILIES** Multi-coloured patterns galore. **TOWERS OF HANOI** The age old puzzle. **LUNAR LANDER** Test your skill as an astronaut. **POSITRON INVADERS** A version of the old arcade favourite. **MOON RESCUE** Avoid the asteroids and save the spacemen. **STARS** A program making pretty pictures. **TAPESTRY** Symmetry and colour combine.

On the introductory tape:

ANAGRAM Sort out the jumbled letters. **DOODLE** Multicoloured graphics. **EUROMAP** Test your geography. **KALEIDOSCOPE** Electron graphics run riot. **CAPITALS** New upper case letters. **ROCKET, WHEEL, CANDLE** Three fireworks programs. **BOMBER** Drop the bombs before you crash. **DUCK** Simple animation. **METEORS** Collisions in space. **COMBINATIONS** Crack the hidden code. **BUZZ WORD GENERATOR** Let the Electron help you impress. **SIMON** Reactions and memory put to the test. **3-D PLOT** Enter a new dimension. **PLUS LOTS MORE!**

HOW TO ORDER

Please send me the following *Electron User* cassette tapes:

Twelve programs from the May issue	£
Eleven programs from the April issue	£
Twelve programs from the March issue	£
Nine programs from the February issue	£
26 programs from the introductory issues	£

I enclose the sum of £

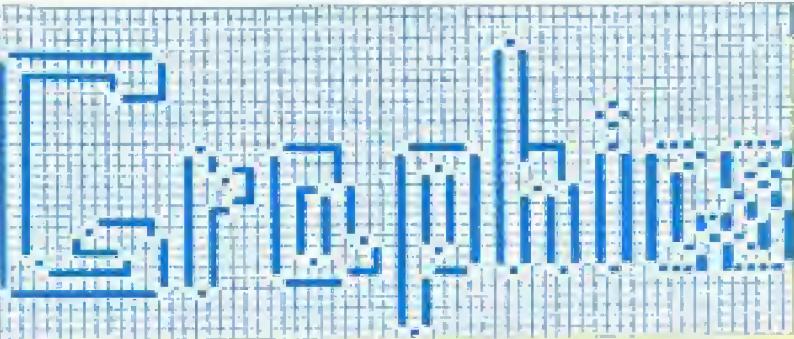
£

Name

Address

POST TO: Tape Offer, *Electron User*, Europa House,
68 Chester Road, Hazel Grove, Stockport SK7 5NY.





From Page 23

6, but you can have any two of them.

All you do is tell the micro that the colour code number 0 will in future mean green or red or whatever, while the colour code number 1 will in future stand for blue or some contrasting colour.

This is done with the VDU 19 command mentioned earlier.

Let's try it in action. Put your Electron into Mode 6—or 0, 3, or 4 if you want. Now see if we can swap from the boring old white letters on a black background to yellow letters on a blue background.

Type in the following:

VDU 19,0,4,0,0,0

and press Return. If you've done it correctly you should see all the parts of the screen that were black turn to blue.

Now enter:

VDU 19,1,3,0,0,0

and you should see the parts that were white turn to yellow.

It's very important that you

type these VDU commands in accurately as a slight error in the typing can cause chaos on the screen.

Now try typing in something on the Electron and you'll see that the foreground colour is now yellow while the background colour is blue.

What's happened is that the first VDU 19 we typed in told the micro that in future the colour that corresponded to code 0 would now be blue.

Magically anything that had been put on the screen in the colour coded 0 when it was black now turns to blue.

The second VDU 19 told the Electron that from now until further notice the colour associated with the colour code 1 would be yellow.

Again, all the previously printed white parts of the screen magically turn to yellow.

If you think about it, this has to be the case.

Mode 6 is a two colour mode, so as soon as we pick new colours for the foreground and background the old colours have to change. If they didn't there'd be more than two on the screen at any one time.

The format of the VDU 19 statement is very simple. It's just:

VDU 19,code number,
palette number,0,0,0

Or, rather more formally:

VDU 19, logical colour
number, actual colour
number,0,0,0

The VDU 19 part tells the Electron that you want to change the colours that are attached to the colour codes.

The next number is the code number of the colour that you

want to change. In Mode 6 this will be either 0 or 1.

The palette number, or actual colour number, is the number that identifies the colour we will actually be using.

It would be nice if we could just tell the Electron:

VDU 19 Black,Blue,0,0,0

and then have all the background turn to blue. Sadly we can't do it like that. We have to use numbers.

The first number is easy. It's just the colour code number that we've used along with the COLOUR command.

The second number, the palette number, is the number that identifies which of the 16 available colours we want. These numbers are listed in Figure II.

The three final zeroes have to be there, allegedly for future expansion of the system. Don't leave them out or chaos will abound.

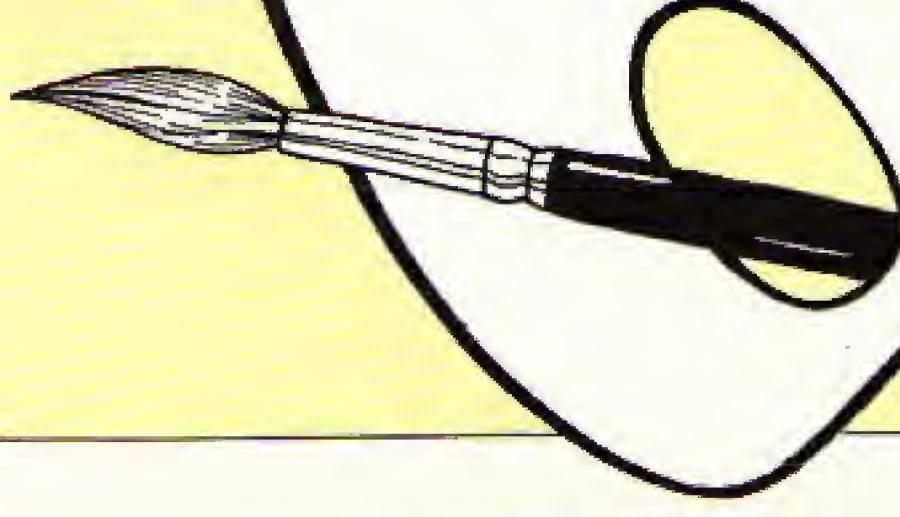
Now suppose we're in Mode 6 and we want a magenta background colour and green foreground colour.

The colour code that controls the foreground is colour

Modes 0, 3, 4, 6
can have
any two of
these colours

Modes 1 and 5
can have
any four
of these
colours

Palette Number	Palette Colour
0	Black
1	Red
2	Green
3	Yellow
4	Blue
5	Magenta
6	Cyan
7	White
8	Flashing black-white
9	Flashing red-cyan
10	Flashing green-magenta
11	Flashing yellow-blue
12	Flashing blue-yellow
13	Flashing magenta-green
14	Flashing cyan-red
15	Flashing white-black



Mode 2
has all
of these
colours



From Page 25

code 1. (Figure 1 shows the colour codes or logical colour numbers.)

I want the foreground to be green so I look at Figure 1 which tells me that the palette number for green is 2. So:

VDU 19,1,2,0,0,0

will make colour code 1 refer to green.

Now the background colour code is 0 and the palette number of magenta is 5 so I want:

VDU 19,0,5,0,0,0

Horrible isn't it? If you get tired of the way you've set up the screen and want to get back to the default colours all you have to do is enter:

VDU 20

This sets the colours back to normal.

So to recap, in the two colour modes we can only have two colours on screen at any one time. However we are not stuck with the normal default colours of black and white.

We can pick any of the 16 colours that are available in Mode 2 but we can only have two of them.

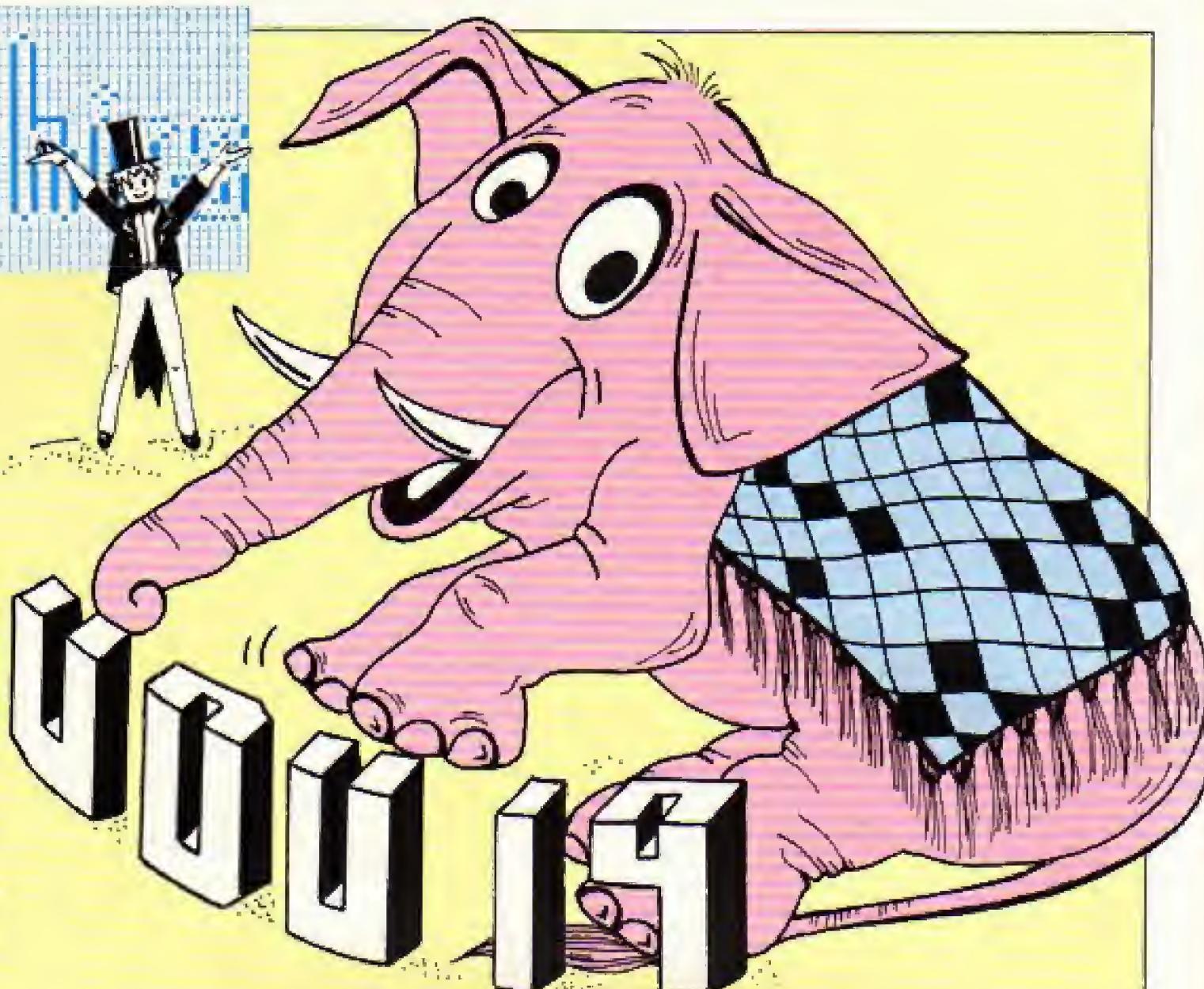
We select the new colours that we want by using the VDU command. This assigns new colours to the colour codes allowed for that mode.

Program 1 illustrates this assignment of colours using VDU 19.

The FOR...NEXT loop in lines 40 to 90 changes the foreground colour - code 1 - to each of the 15 available colours in turn.

The loop in lines 110 to 160 does the same for the background colour, code 0.

Of course what applies to the two colour modes applies to Modes 1 and 5, the four colour modes. The difference



is that with these modes you have four colour codes - 0, 1, 2 and 3 - to play with.

Normally these are black, red, yellow and white, but you can alter them to more exotic colours using the VDU 19 command in exactly the same way as before.

Hence if we're in Mode 5 and we want the colour coded 1 to be blue instead of the usual red we enter:

VDU 19,1,4,0,0,0

and all the red turns to blue.

Of course in Mode 2 we've already got our allocation of 16 colours so the code numbers (0 to 15) are exactly the same as the palette numbers.

Now before you read on just try all this out on your Electron.

Play around with the colours for a while, using the COLOUR command we covered last month and experimenting with the VDU 19 command.

It only takes a little practical experience to get the hang of changing colours. A concept that can appear difficult on paper soon becomes easy when you try it out for yourself.

Remember that each mode only allows a limited number of colours on the screen. The Electron isn't bothered which of the 16 colours it can produce are used in any mode. But you can only have that mode's ration.

This means that you can only have two colours on screen in Modes 0, 3, 4 and 6, four colours in Modes 1 and 5 and only in Mode 2 are you

allowed the full allocation of 16.

To sum up, each mode has its ration of colour code numbers. These are the numbers we used last month after the COLOUR command.

When we enter a mode these colour codes are assigned to the default colours of that mode. We can, however, reassign them to any of the 16 colours using the VDU 19 command.

We don't have to be stuck with colour 2 being yellow in Mode 5. We can make colour 2 cyan with:

VDU 19,2,6,0,0,0

and from now on the command:

COLOUR 2

will produce cyan text - and any previous text in colour 2 will turn from red to cyan.

Have fun experimenting. If things get confused remember you can undo your VDU 19s with a VDU 20.

That's all for this month. In my next article I'm going to explore some of the uses of VDU 19.

In the meantime, why not think about this: *Why should I use a VDU 19 to assign all my Mode 2 colour codes (0 to 15) to be black (palette colour 0)?*

I'll tell you next time.

```

10 REM PROGRAM 1
20 MODE 6
30 VDU 23,1,0;0;0;
40 FOR palette=0 TO 15
50 VDU 19,1,palette,0,0,0
60 PRINT TAB(5,10)*code
  number 1"
70 PRINT TAB(5,13)*palette
  number ";palette
80 FOR delay=1 TO 2000
  :NEXT
90 NEXT
100 VDU 20
  :CLS
110 FOR palette=0 TO 15
120 VDU 19,0,palette,0,0
  ,0
130 PRINT TAB(5,10)*code
  number 0"
140 PRINT TAB(5,13)*palette
  number ";palette
150 FOR delay=1 TO 2000
  :NEXT
160 NEXT

```

CHASER!!

EVER had one of those days when you seem to have done nothing but chase your tail?

Well now you have a chance to chase someone else's tail in this two player game for your Electron.

All the instructions are in the listing. You'll find it easy to learn and fun to play.

So type it in and get chasing.

By PETER MITCHELL and JAMES McPHERSON

30	Defines sound envelope 1.
50	Gets rid of flashing cursor.
60	Defines foreground and background colours for introduction.
80	Calls procedure intro.
90-120	Selects mode and gets rid of flashing cursor.
	Selects a colour.
130-160	Defines arrow characters.
170-210	Defines variables.
220	Joins text and graphics cursor.
260-330	Checks keys to see if they are being pressed.
340-370	Alters main variables.
380-450	Prints arrows and checks if there is an obstruction in their way.

460-500	Makes background sound increase in pitch as time goes on.
540-620	When called this procedure will play the notes in WS in order and each note will have a length of L%. For example typing PROCs ("ABCD",4) will make the computer play an A, B, C, and D in order.
650-700	Checks if player one cannot move.
730-820	If player two's arrow arrives at an obstruction, tells computer which way arrow can go.
850-920	Checks if player two cannot move.
930-1020	If player one's arrow arrives at an obstruction, tells computer which way arrow can go.
1050-1090	Checks to see if it is a draw.
1130-1140	Prints who has won.
1150	Defines notes for "He's a Jolly Good Fellow".
1160-1230	Adds to relevant player's score.
1260-1640	Prepares computer for starting new game.
1780-1910	Prints players' scores.

Main Variables

X1% & Y1%	Coordinates of player one's arrow.
X2% & Y2%	Coordinates of player two's arrow.
C1%	Player one's arrow character.
C2%	Player two's arrow character.
X3% & Y3%	Direction of player one's arrow.
X4% & Y4%	Direction of player two's arrow.
SO%	Pitch of background sound.
G%	Number of wins player one has had.
H%	Number of wins player two has had.

```

10 REM CHASER
20 REM (C) ELECTRON USER
30 ENVELOPE 1.1.1,-1
,1,10,10,10,125,0
,0,0,75,75
40 MODE 6
50 VDU 23;8202;0;0;0;
60 VDU 19,0,4,0;0,19
,1,3,0,0
70 H1=0
:H2=0
80 PROCintro
90 MODE 1
100 SO%=0
110 VDU 23;8202;0;0;0;
120 VDU 19,3,10,0,0,0
130 VDU 23,225,24,60,125
,219,153,153,153,153
140 VDU 23,225,153,153
,153,153,219,126,60
,24
150 VDU 23,227,249,12
,5,255,255,6,12,248
160 VDU 23,228,31,48,96
,255,255,96,48,31
170 X1I=RND(10)
:Y1I=RND(31)
180 X2I=RND(10)+30
:Y2I=RND(31)
190 C1I=225
:C2I=226
200 I3I=0
:I4I=0

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are given on Page 4 of the February issue.

```

210 Y3I=1
:Y4I=-1
220 VDU 5
230 TIME =0
240 REPEAT
250 X1I=X1I
:Y1I=Y1I
260 IF INKEY (-98)
THEN I3I=-1
270 IF INKEY (-67)
THEN X3I=1
:Y3I=0
280 IF INKEY (-27)
:Y4I=0
290 IF INKEY (-104)
THEN X4I=1
:Y4I=0
300 IF INKEY (-66)
THEN Y3I=-1
:I3I=0

```

```

:C1I=226
310 IF INKEY (-17)
THEN Y3I=1
:X3I=0
:C2I=225
320 IF INKEY (-105)
THEN Y4I=-1
:X4I=0
330 IF INKEY (-73)
THEN Y4I=1
:X4I=0
340 X1I=X1I+X3I
350 X2I=X2I+X4I
360 Y2I=Y2I+Y4I
370 Y1I=Y1I+Y3I
380 IF POINT(X1I+32+16
,Y1I+32-16)>>0
THEN PROCc
390 GCOL 0,1
400 MOVE X1I+32,Y1I+32
410 VDU C1I
420 IF POINT(X2I+32+16
,Y2I+32-16)>>0
THEN PROCc2

```

```

:END
430 GCOL 0,2
440 MOVE X2I+32,Y2I+32
450 VDU C2I
460 UNTIL TIME >100
470 SO%=SO%+5
480 SOUND 1,1,SO%,1
490 TIME =0
500 GOTO 240
510 END
520 :
530 :
540 DEF PROCc (W$,L$)
550 W$="A BC D EF G"
560 L$="a bc d ef g"
570 FOR D=1 TO LEN (W$)
580 E$=MID$(W$,D,1)
590 H$=INSTR(L$,E$)
600 IF H$=0
THEN H$=INSTR(L$,E$)
,61)
:SONG 1,-13,H$+4+37
,12+2
,ELSE SONG 1,-13,H$+4
,37,L$
610 NEXT
620 ENDPROC
630 :
640 :
650 DEF PROCc2
660 PROCc1elp
670 IF X3I=0 AND Y3I=0

```

Turn to page 59

beware of low-flying sheep!

REMEMBER Bright Eyes, the program from Mike Rowe we featured in the March Electron User? We asked what next and wondered whether readers would send us programs with sheep leaping over gates. Well they have - or at least, Mike Rowe has risen to the occasion and sent us one. He doesn't tell us whether or not he's an insomniac! Now, who's going to send us a low flying pig?

```

10 REM Sheep jumping
   over a fence
20 REM From same hole
   as 'RABBITS'
30 REM By Michael Rowe
40 REM (C) ELECTRON USER
50 MODE 2
60 VDU 23,0,8202;0;0;0;
70 VDU 19,128,132,0,0
   ,0
   : REM Sky
80 6COL 0,2
   : REM field
90
100 MOVE 0,0
   : MOVE 0,500
   : PLOT 85,1280,500
110 MOVE 0,0
   : MOVE 1280,500
   : PLOT 85,1280,0
120
130 PROCchrs
140
150 FOR Y=10 TO 15
160 PRINT TAB(7,Y) "I"
   : REM wall
170 NEXT Y
180

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are given on Page 4 of the February issue.

```

190 PROCsheep(16,13)
200 PROCsheep(13,13)
210 PROCsheep(10,10)
220 PROCsheep(7,7)
230 PROCsheep(4,10)
240 PROCsheep(1,13)
250 PROCsheep(0,13)
260 GOTO 190
270 END
280 #####
290 DEF PROCchrs
300 VDU 23,224,4,63,111
   ,255,126,30,15,7
310 REM Mid top
320 VDU 23,225,0,0,0,
   ,0,0,181,255
330 REM Rusp
340 VDU 23,226,0,0,0,0
   ,0,0,82,244
350 REM Front
360 VDU 23,227,7,15,7
   ,31,15,31,15,7
370 REM Bot mid
380 VDU 23,228,255,255
   ,255,255,255,255,255
   ,26
390 REM Bot back
400 VDU 23,229,245,248
   ,248,248,240,240,240
   ,240
410 VDU 23,229,245,248
   ,248,248,240,240,240
   ,240
420 REM Front legs 1st
430 VDU 23,230,2,2,2,3
   ,0,0,0,0
440 REM Front legs 2nd
450 VDU 23,231,0,0,0,192
   ,64,0,0,0
460 REM Back legs
470 VDU 23,232,16,16,144
   ,240,0,0,0,0
480 ENDPROC
490

```

```

500 DEF PROCsheep(x,y)
510 PRINT TAB(x,y)
   CHR$ 224;CHR$ 225;
   CHR$ 226
520 PRINT TAB(x,y+1)
   CHR$ 227;CHR$ 228;
   CHR$ 229
530 PRINT TAB(x,y+2)
   CHR$ 230;CHR$ 231;
   CHR$ 232
540
550 REM holds sheep for
   a while
560 TIME =0
   : REPEAT UNTIL
   TIME = 35
570
580 REM rubs out sheep
590 PRINT TAB(x,y) SPC (3)
600 PRINT TAB(x,y+1)
   SPC (3)
610 PRINT TAB(x,y+2)
   SPC (3)
620 ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 47

THE Electron's superior graphics are capable of producing a very good picture. However this usually requires that the picture be expressed in mathematical form or be reduced to a series of coordinates which the computer plots.

The program given here offers an alternative approach by allowing the computer to interact with the user.

You can position lines precisely, anywhere on the screen, by using rubber-banding techniques.

This is where a line is drawn on the screen by fixing one end and then moving the other until it is in the desired position.

The line appears to grow from the fixed point like a rubber band, hence the name.

The cursor keys control a single point – or pixel – on the screen. The longer a key is held down the faster the point moves.

This permits slow and careful positioning while allowing rapid movement to another area of the screen.

Like all graphics programs on the Electron, we must decide which mode to use. This is normally a compromise between screen resolution and the number of colours available.

This program uses Mode 1 and thus allows reasonable resolution with a choice of four colours, including the background.

The program can be modified easily to use another mode if this compromise is not to your liking.

The program will run in a series of modes. In this case

MIKE COOK illustrates rubber-banding techniques you can try on your Electron

Quick on the draw

"mode" refers not to a graphic mode, but rather to what shape is currently being generated.

When running the program the screen will go blank. Nothing will happen until one of the "modes" is entered. To do this type the letter for the appropriate one.

For example, let's draw a straight line by pressing the L key.

The top line of the display should now say LINE, and you should see a single lit point at the bottom left hand corner of the screen.

This can be moved by using any of the four cursor keys.

When it is in the correct position for the start of the line, press any other key to fix the start of the line.

When the point is moved again a line will be drawn from the start of the line to the new position.

This line will follow the point, behaving like a rubber band on the screen.

When the end position of the line is at the correct place press the Return key and the line will be drawn in permanently.

You will then be back in the

Command mode, ready to draw another shape.

If you want to carry on drawing lines press the space bar instead of the Return key and you will stay in the Line mode.

If you want the start of the new line to be the same point as the end of the old one, press "J" for join instead of the space bar.

Note that it is possible to move the point off the screen. Indeed you may want to do this intentionally.

When this occurs the coordinates of the point you are moving will appear on the top line of the display. This lets you know which way to go when you want to return the point to the screen.

The Triangle mode – key T – works in a similar manner, with first the base line being rubber-banded and then the full triangle.

In this mode the J key will join up the new triangle to the last side of the old one.

When drawing a rectangle – key R – the first point fixes one corner and the second point will fix the opposite corner.

The Join key will join the next rectangle to the last corner of the previous one.

When selecting the polygon mode – key P – you will be asked how many sides the polygon is to have.

If you require a circle then a

large number like 40 should be used.

In this mode the radius is defined by rubber banding, but this radius line disappears when the polygon is drawn.

If the Join option is used the new polygon will be drawn with the same centre as the last one.

You can also change the colour of the lines by pressing the C key. This will cycle through the three colours available in Mode 1.

The colours have been redefined from the default choice in line 170. They could be changed to suit your own preferences.

When you have finished your masterpiece the screen can be saved as a file by typing S.

You will be asked to provide a file name and the memory locations that make up the screen will be saved. You must then put a tape in the recorder for the file.

The file is saved as a block of memory and, as this is 20k long, it takes some time to save.

The program also lets you load a previously dumped file back to the screen to be worked on further. This is done by typing L.

It can also be done from your own programs by performing a CLS command and then a *LOAD "FILENAME", using, of course, the file name employed to save the screen.

You will see the picture appear block by block on the screen.

Note that in order for this to work you have to be in the same graphics mode as the computer was when the picture was created.

However you may have different colours as defined by the VDU 19 commands.

Listing starts on Page 57

Here are some hints for typing in the program:

Line 160 defines a text window of one line at the top of the screen. This line is best left out until all the typing errors are corrected, as any error messages will scroll off the top before you can read them.

As the cursor keys are used to move the point they are not in the correct mode for editing a mistyped line.

Function key Q has been set up – in line 40 – to restore the editing function and the auto repeat of the keys.

It should be pressed to regain these functions.

Some variables start with the letter O, such as OX% (Old X). Do not confuse this with the number 0.

In line 400 the space between the quote marks and the number is vital. You will get an error message if it is left out. Unfortunately the error message is not all that helpful.

In various lines, such as line 240, note that there is no space between the quote marks. If a space is placed there the loop will end prematurely and that section will appear to do nothing.



NOW AVAILABLE ON THE ELECTRON

D.A.C.C.'s SPRITE - GEN

Runs in 4 colours Mode 5

PRICE £9.95

The BBC version of this highly successful package has won a nomination in the 1984 British Micro Computer Awards.

Write your own 'Arcade Action' games with D.A.C.C.

Sprite-Gen

This amazing and revolutionary new piece of software, written for the BBC Model B by Dennis Ibbotson, represents the biggest step forward for BASIC programmers since the release of the BBC Micro itself. It allows you to create multi-coloured, fast moving SPRITES, controlled simply from your own BASIC program. Now you can write the kind of "Arcade Action" games you always dreamed of writing before you discovered that BASIC can't achieve the speeds necessary. Until now, only experienced machine-code programmers could produce "Ghost Gobbling Monsters" and "Light Speed" spaceships. With SPRITE GRAPHICS all the creatures and objects you can imagine are at your command, moving smoothly at any speed and in any direction you choose. Incredibly, SPRITES can be created using ALL SIXTEEN logical colours - eight steady and eight flashing. And as if that were not enough you animate your SPRITES with individual movements such as "a man who walks", "a bird that flaps its wings", "Invaders that pulse menacingly", the possibilities are endless! When you own the SPRITE GENERATOR package you have access to every sort of high-speed animation technique you need. Buying expensive machine-code games may become a thing of the past. Look at the following impressive list of features you can access from your own BASIC programs ...

- Up to 32 SPRITES on screen at any time.
- Limitless SPRITE design using the SPRITE Generator program included in the package, allows ALL SIXTEEN logical colours "in each SPRITE" if desired. Full operating system capability of logical/actual colour assignment.
- There can be up to EIGHT different SPRITE DESIGNS active at one time, each of which can have up to THREE "CLONES", (copies of the primary SPRITE but each with individual movement control).
- Each SPRITE actually has TWO images which given slight differences will achieve the animation effects when the two are alternated. Or, if you choose, give the two images totally different designs and you have created two SPRITES out of one, usable alternately. This technique can also be applied to the CLONES which means that all 32 SPRITES can be animated, multi-coloured, moving objects!!!
- Once you have completed the design of your SPRITES using the simple grid-based generator utility, they and the high speed machine-code routines that control their movement are secreted into RAM and the BASIC system is ready to accept your own program lines through which you can direct the SPRITES to appear, move, disappear or just remain stationary, with the simplest commands you could imagine.
- SPRITES can be linked together in pairs or groups to produce large scale animation. Of course, if you wish they can be as small as a single pixel.
- Your own creations can move in front of each other with no loss of detail.

SPRITE-GEN is supplied as a package containing:

- Sprite-Generator program
- Two 'fast-action' demonstration programs
- Sprite-Gen control routines
- Illustrated user manual with examples and listings

All for only £17.95 (pp and VAT included).

In U.S. \$49.95

DRAGON, ATARI 400/800, BBC MODEL/B TRS 80 C/C 32K
747 FLIGHT SIMULATOR

Superbly realistic instrumentation and pilot's view in lifelike simulation which includes emergencies such as engine fires and systems failures. This program uses high resolution graphics to the full to produce the most realistic flight-deck display yet seen on a home computer. There are 21 real dials and 26 other indicators (see diagram). Your controls operate throttle, ailerons, elevators, flaps, slats, spoilers, landing gear, reverse thrust, brakes, etc. You see the runway in true perspective. Uses joysticks and includes options to start with take-off or random landing approach. "A real simulation, not just another game." (Your Comp. Apr. 83). ACTUAL SCREEN PHOTOGRAPH

CASSETTE £9.95 (pp and VAT included).
In U.S. \$27.95 (pp included).

(U.K. orders despatched within 48 hours)

Dealer and foreign distributor enquiries now being taken.
Software writers - sell your programs in the U.S. through DACC.

To DACC Ltd., Dept. EU, 23 Waverley Road, Hindley, Wigan, Lancs. WN2 3BN.

Please rush me:

- qty. SPRITE-GEN at £17.95 each (BBC Model/B only)
- qty. SPRITE-GEN at £9.95 each (Electron only)
- qty. 747 FLIGHT SIMULATOR at £9.95 each (state machine)

I enclose a cheque/P.O. to the value of _____

NAME _____

ADDRESS _____

POST CODE _____

ELECTRON USERS!

Don't miss May's

THE MICRO USER

It's the biggest issue ever, crammed with fascinating ideas and programs.

IN ITS FEATURE PACKED PAGES YOU'LL FIND...

★ **DAM RAIDERS:** defend the dam in this all-action blockbuster.

★ **SPIROTWO:** multiply your graphics windows with spectacular results.

★ **ENVELOPES:** explore sound the hands-on way.

★ **BIG LETTERS:** large letters made simple.

★ **PROCEDURES:** an introduction for beginners.

And, of course, most of the many programs featured in this month's Micro User can be easily modified for the Electron.

All in all, if you're an Electron User, it makes sense to also buy The Micro User.

The May issue is now on sale at your newsagents.

Think up a link up

and WIN the
Signpoint
joyport!

ELECTRON USER
FREE CONTEST

EXERCISE your imagination and win yourself a Signpoint joyport, the interface that allows you to use joysticks with your Electron.

This month's Casting Agency contains six characters - a dragon, a devil, two musical notes, an umbrella and a TV.

Apart from the fact that they've all been sent in by our readers, and they're in May's Casting Agency, what else could possibly link them all?

Let's have your ideas on why they're all together. Then finish off the sentence in the coupon in 25 to 50 words.

The best entry received before May 30, 1984, will receive the Signpoint joyport and our winner will be able to add a whole new dimension to his Electron.

WE HAVE A WINNER

THE prize for our February competition - 12 month's supply of Acornsoft Software - attracted a record number of entries.

Mind you, since it was our first competition that was no surprise!

What was surprising was the number of you who tried to put the Electron's outstanding features into the same order as

our experts.

Winner of the software was Robert Waite, of Finmere, Bucks.

Not only did his list correspond with ours, we particularly like the way he finished the tie-breaker:

"I'm glad I got my Electron because it was getting rather cold camping outside W.H. Smiths".

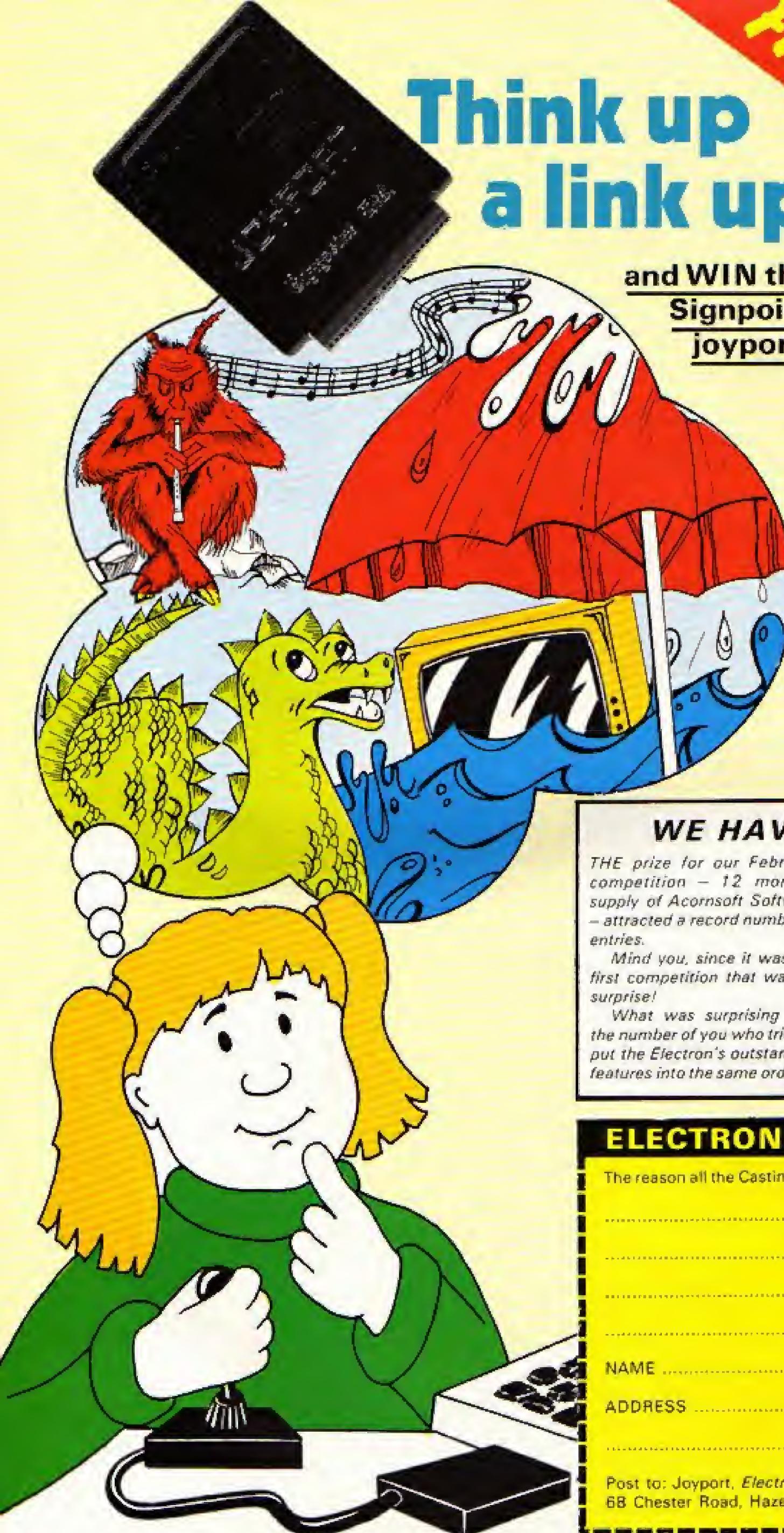
ELECTRON USER CONTEST

The reason all the Casting Agency characters are together is:

NAME

ADDRESS

Post to: Joyport, Electron User Contest, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.



SOUNDS..



EXCITING

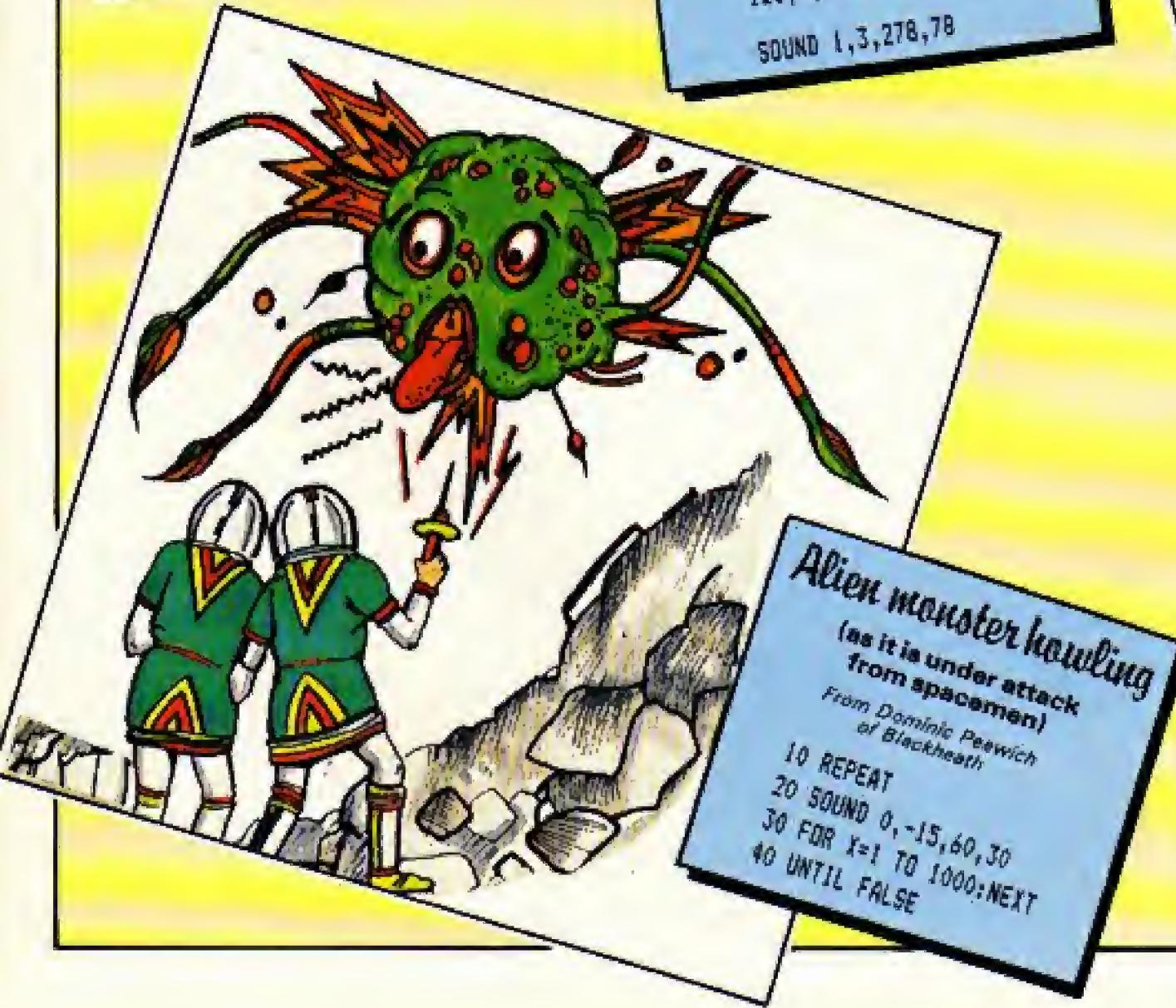
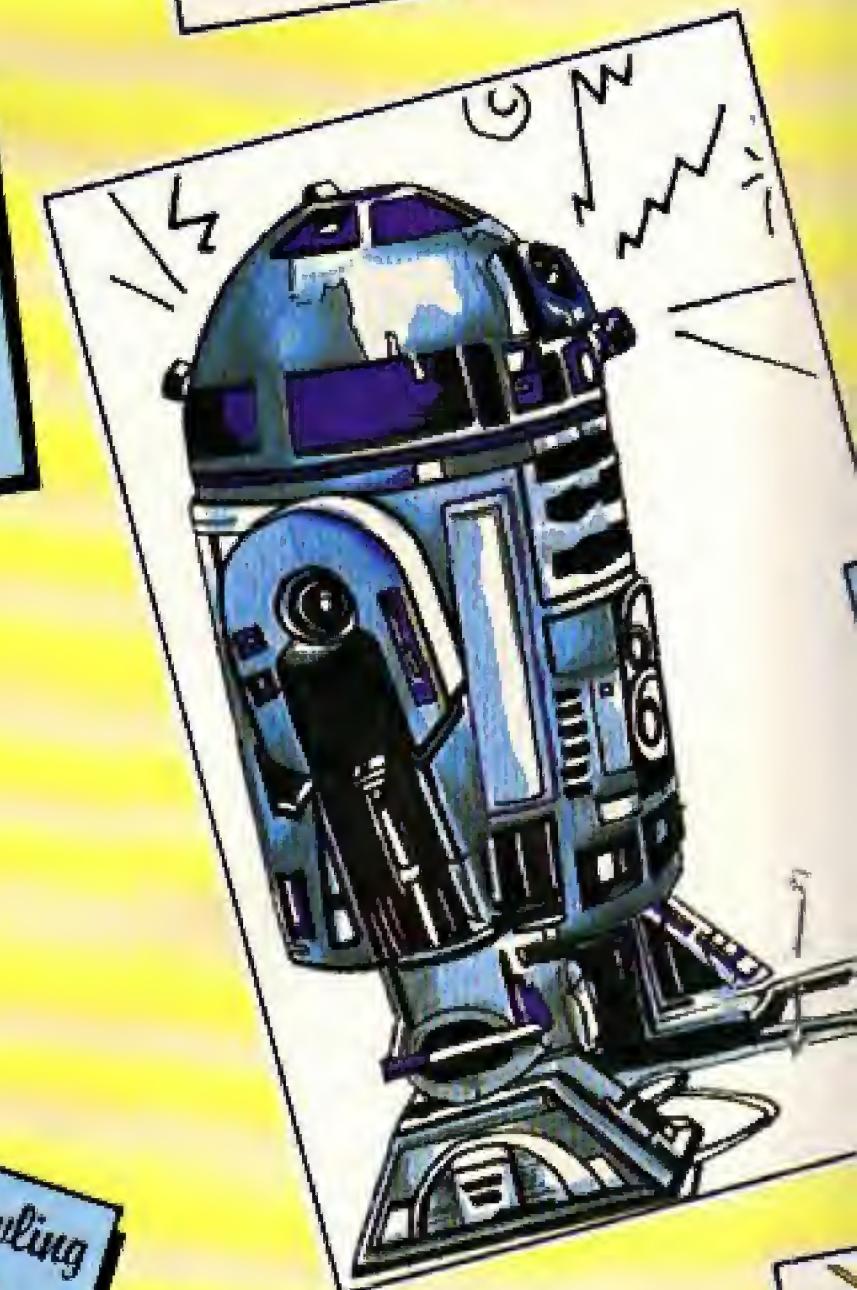
BUILD up a library of exciting sounds to enhance your own programs with these listings. And many more in the months to come!



Electric Alarm Clock

From Martin Young
of Mansfield, Woodhouse

ENVELOPE
3,1,-36,-93,-9,11,0,0,
126,0,0,-125,126,126
SOUND 1,3,278,78



Alien monster howling (as it is under attack from spacemen)

From Dominic Peewich
of Blackheath

```
10 REPEAT
20 SOUND 0,-15,60,30
30 FOR X=1 TO 1000:NEXT
40 UNTIL FALSE
```

SPACE PODS

By NICOLAS TIMBERLAKE

*Fight for survival
..on the distant
planet Tau Theta*

YOU are tired but you must continue. For hours the battle has been raging and still the aliens press home their attacks.

As commander of the Federation Fleet your mission is to protect the underground base on Tau Theta. The aliens are dropping robot space pods that burrow into the planet's surface.

Were they to reach it and discover its scientific secrets the whole universe would fall to their onslaught.

Despite fighting desperately, your battle fleet has been destroyed. The aliens' space pods have proved to be

almost invincible.

You have found refuge on one of two stationary satellites far above the surface of Tau Theta. Your last hope is the laser cannon based on the satellites, but their computer guidance has been destroyed.

You will have to fire the cannons manually. But the space pods are relentless and it's getting harder to keep them at bay.

How long will you be able to survive?

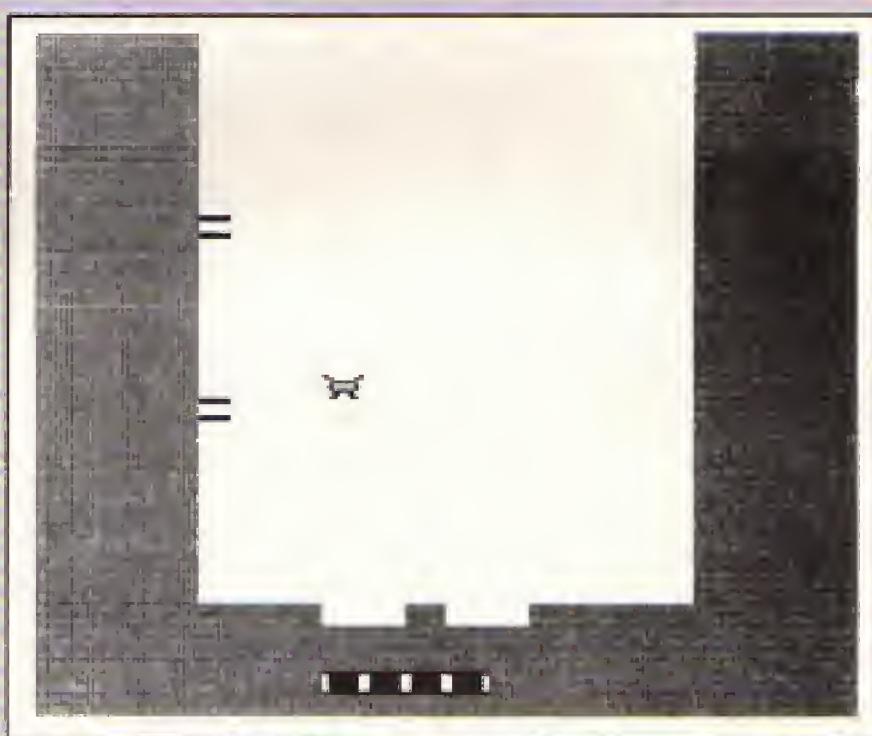
• *Space Pods* originally appeared in the July 1983 issue of *The Micro User* and has been specially adapted for the Electron.

```

10 REM *****
20 REM * SPACE PODS *
30 REM *****
40 MODE 6
  PRINT TAB(10,6); "SPACE
  PODS !"
50 REM (C) ELECTRON USER
60 PRINT TAB(9,9); "By N.Timb
  erlake"
70 PRINT TAB(3,16); "Do you
  want instructions(Y/N)?"
  G$=GET$
  IF G$="Y"
    THEN PROCINSTRUCTIONS
80 MODE 2
90 ENVELOPE 1,1,-1,0,0
  ,2,0,0,126,0,0, -10
  ,126,126
100 SCOREI=0
  :T=0
110 DEF FNpoint(X,Y)=
  POINT((64*X)+32),(32+(31-Y
  )+16))
120 VDU 23,231,255,126,126
  ,126,126,126,126,255
  :B$=CHR$ 231+CHR$ 231+
  CHR$ 231+CHR$ 231
130 VDU 23,233,129,66,60
  ,66,66,60,36,102
140 VDU 23,232,252,252,0
  ,0,0,0,252,252
150 COLOUR 129
  :COLOUR 6
  :CLS
160 VDU 23;8202;0;0;0;
170 VDU 23,230,255,255,255
  ,255,255,255,255,255
180 VDU 23,240,0,0,255,0
  ,0,255,0,0
200 AX=-1
210 AZ=AZ+1
220 IF AZ=4
  THEN AZ=16
230 IF AZ>19
  THEN GOTO 280
240 FOR BX=0 TO 29
250 PRINT TAB(AZ,BX);
  CHR$ 230
260 NEXT BX
270 GOTO 210
280 BX=24
290 BX=BX+1
300 IF BX>29
  THEN GOTO 350
310 FOR AZ=0 TO 19
320 PRINT TAB(AZ,BX);
  CHR$ 230

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are given on Page 4 of the February issue.



```

  THEN GOTO 530
440 YX=YX+1
450 IF YX>29
  THEN PRINT TAB(XZ,YX-1)
  CHR$ 32
  :GOTO 400
460 IF FNpoint(XZ,YX)=6
  THEN PRINT TAB(XZ,YX-1)
  CHR$ 32
  :PRINT TAB(XZ,YX)
  CHR$ 32
  :GOTO 400
470 IF YX<0
  THEN PRINT TAB(XZ,YX-1)
  CHR$ 32
480 PRINT TAB(XZ,YX);
  CHR$ 233
490 IF YX=28 AND XZ>6
  AND XZ<11
  THEN PROCEND
500 IF SCOREZ>2000
  THEN T=0
510 FOR VBZ=1 TO T
  :NEXT VBZ
520 GOTO 420
530 REM WHICH ONE
540 SOUND 0,1,100,1
550 PROCTOP
560 GOTO 420
570 DEF PROCEXPLSION
580 SOUND 1,1,100,1
590 SCOREZ=SCOREZ+250
  :PRINT TAB(2,30); "SCORE: "
  :NEXT
  :GOTO 750
790 IF PZ=257
  THEN FOR AZ=1 TO 100
  :NEXT
800 IF PZ<256
  THEN SOUND 1,-15,PZ
  ,1
810 GOTO 720
820 DATA 81,69,53,69,81
  ,257,69,257,61,73,49
  ,61,73,257,61,257,81
  ,69,53,69,81,257,69
  ,257,33,41,49,53,256
830 DEF PROCINSTRUCTIONS
840 CLS
850 PRINT TAB(10,3); "SPACE
  PODS !"
860 PRINT TAB(3,8); "The objec
  t of the game is to stop
  the space pods landing
  and eating their way
  to your base. To stop
  them you have to shoot
  them down with your
  laser guns. You have
  two laser guns which
  can be fired by pressing
  ";
970 PRINT "either 'W' or 'I'. E
  very time you hit a space
  pod, you will get 260
  points."
880 PRINT TAB(3,20);CHR$ 133
  "Press any key to continu
  e";
  :G$=GET$
  :ENOPROC

```

:NEXT
 740 IF PZ=256
 THEN PRINT TAB(4,14)
 "YOU ARE DEAD"
 750 IF PZ=256
 THEN PRINT TAB(4,16)
 "ANOTHER 60";
 :INPUT G\$
 760 IF G\$="Y"
 THEN GOTO 90
 770 IF G\$="N"
 THEN CLS
 :END
 780 IF G\$(>"Y" AND G\$(>"N")
 AND PZ=256
 THEN PRINT TAB(4,16)
 :
 :
 :GOTO 750
 790 IF PZ=257
 THEN FOR AZ=1 TO 100
 :NEXT
 800 IF PZ<256
 THEN SOUND 1,-15,PZ
 ,1
 810 GOTO 720
 820 DATA 81,69,53,69,81
 ,257,69,257,61,73,49
 ,61,73,257,61,257,81
 ,69,53,69,81,257,69
 ,257,33,41,49,53,256
 830 DEF PROCINSTRUCTIONS
 840 CLS
 850 PRINT TAB(10,3); "SPACE
 PODS !"
 860 PRINT TAB(3,8); "The objec
 t of the game is to stop
 the space pods landing
 and eating their way
 to your base. To stop
 them you have to shoot
 them down with your
 laser guns. You have
 two laser guns which
 can be fired by pressing
 ";
 970 PRINT "either 'W' or 'I'. E
 very time you hit a space
 pod, you will get 260
 points."
 880 PRINT TAB(3,20);CHR\$ 133
 "Press any key to continu
 e";
 :G\$=GET\$
 :ENOPROC

This listing is included in
 this month's cassette
 tape offer. See order
 form on Page 47

EVERYTHING TO DO WITH THE electron

Contact
**H.C.C.S.
ASSOCIATES**

533 Durham Road, Low Fell, Gateshead,
Tyne & Wear NE9 5EY.

Tel: (0632) 821924

Retail Sales also at:
H.C.C.S. Microcomputers
122 Darwen Street, Blackburn, Lancs.
Tel: (0254) 672214

ELECTRON

BBC "B"

DIMAX STRUCTURED SOFTWARE

The policy of DIMAX is to produce well written BASIC programs that are not only enjoyable to play, but also provide good working examples of structured programming that can assist in the development of programming skills.

TAPE 1 — SPACE TREK

A traditional computer game entirely re-written to take advantage of the program structures and advanced facilities of the ELECTRON and BBC micros. Provides practice in the use of co-ordinates and bearings.

TAPE 2 — TEN EDUCATIONAL GAMES

All games easily adaptable to suit different ages and needs.

PLUS STANDARD PROGRAMMING FORMAT

A development program containing opening and closing routines, error traps, and over 20 useful library PROC/FNs that can be used in your own work.

Tapes £4.95 each (inc. P and P). £1 discount if both tapes ordered. From **DIMAX Structured Software, 15 Winchester Road, Northampton NN4 9AZ.**

Please mention this magazine by name when ordering.

WALRUS COMPUTER EDUCATION

Don't leave your BBC Micro or Electron on the shelf. Use it — and a WALRUS home study course — to teach yourself structured programming.

STRUCTURED BASIC ON THE BEEB/ELECTRON

A COMPLETELY NEW DEPARTURE IN COMPUTER EDUCATION

★ Specially designed for the beginner ★

★ Set out in ten units ★

★ Includes software cassettes with lots of educational programs ★

★ Assignments for tutor feedback ★

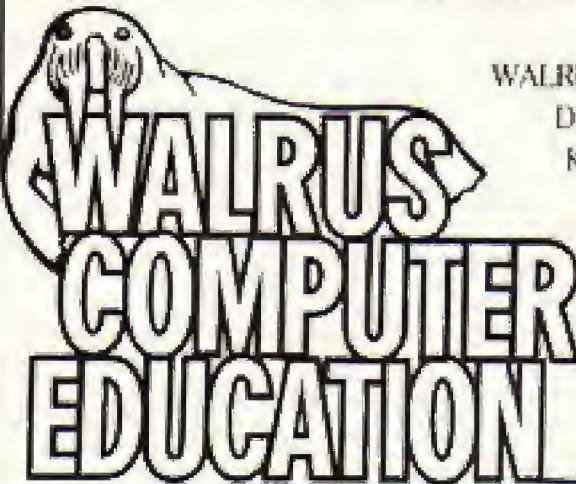
★ Comes in two teaching packs ★

★ Costs only £24 ★

To receive your first teaching pack, send cheque/PO for £24 to:

WALRUS Computer Education
Dial House, Laycock,
Keighley, W. Yorks.

or write for leaflet.



THE BEST ADD-ON FOR
YOUR ELECTRON

electron ELECTRON PRINTER INTERFACE

Frustrated by the Electron's inability to connect to a printer? Hard copy is of great assistance when debugging the longer program, and is of enormous value in any educational situation.

At last a straightforward, economical and easy to use interface to drive most parallel (Centronics) printers is available now... Epson, Seikosha... etc.

Unlike some other interfaces appearing on the market, this module is completely self-contained and does not require cassette based software to be loaded each time the printer is to be used.

Just plug in and use. Obeys all BBC commands... (VOUT, VDU1, VDU2, VDU3, etc). This modular interface measures only 3" x 2" x 4", is entirely self-contained and attaches simply and safely to the rear of the Electron. Absolutely no soldering or technical ability required to fit.

Provided with or without integral printer lead from £24.95
BBC leads available from £7.95 (Spate Printer, Maka, Model etc)

SOFTWARE AVAILABLE ON REQUEST

Supplied complete with comprehensive instructions

MAIL ORDER ONLY SAE FOR DETAILS £24.95
01-771 0695 01-771 0695
PETER JAMES MOORE & ASSOCIATES (MARKETING), 63 HIGH ST, LONDON S.E.26 6EF

KILLA THE UPGRADE

by S.D. Ellington From: BIT TWIDDLERS

If you already own the popular game of Killer Gorilla for the Electron or BBC Micro then 'Killa' will provide:

1. 15 levels of play (BBC) 7 levels of play (Electron.)
2. Variable extended jump.
3. Climb and jump with hammer.
4. Extra lives after 25, 50 & 75 metres.
5. Practice mode.
6. Pause facility.

Start practice session at 'any height', 'any level'. Exercise your new powers and discover new routes. Have a go at the higher levels with a fighting chance.

Written by a professional programmer.

£2.75 + 50p p&p

For disc compatible cassette
by 1st class return post.

BIT TWIDDLERS Dept EU/S,
158 Church End,
Harlow, Essex,
CM19 5PF.

Now available on Micronet and from discerning shops

LET'S GO ON A MATHS HIKE!

ONCE upon a time, many years ago when I was in primary school, our class had a maths teacher who used to take us on "Mathematical Hikes".

Of course we never left the classroom. What he meant was that he'd take us on a tour of our powers of mental arithmetic.

He would tell us the first number of the hike — suppose it was 5 — and say: "Multiply it by 2". Then he'd say something like: "Now add 7 to the total and multiply the result by 6".

When he thought he'd gone far enough he'd ask us the answer, which in this

case is 102.

Occasionally he'd carry on until only one or two of us could keep the total in our heads.

Going on mathematical hikes really made mental arithmetic interesting.

Of course you don't need a teacher to take you on mathematical hikes when you've got an Electron.

Just type in this program and your micro will play the part of the teacher. And it won't keep you in after school! Have fun.

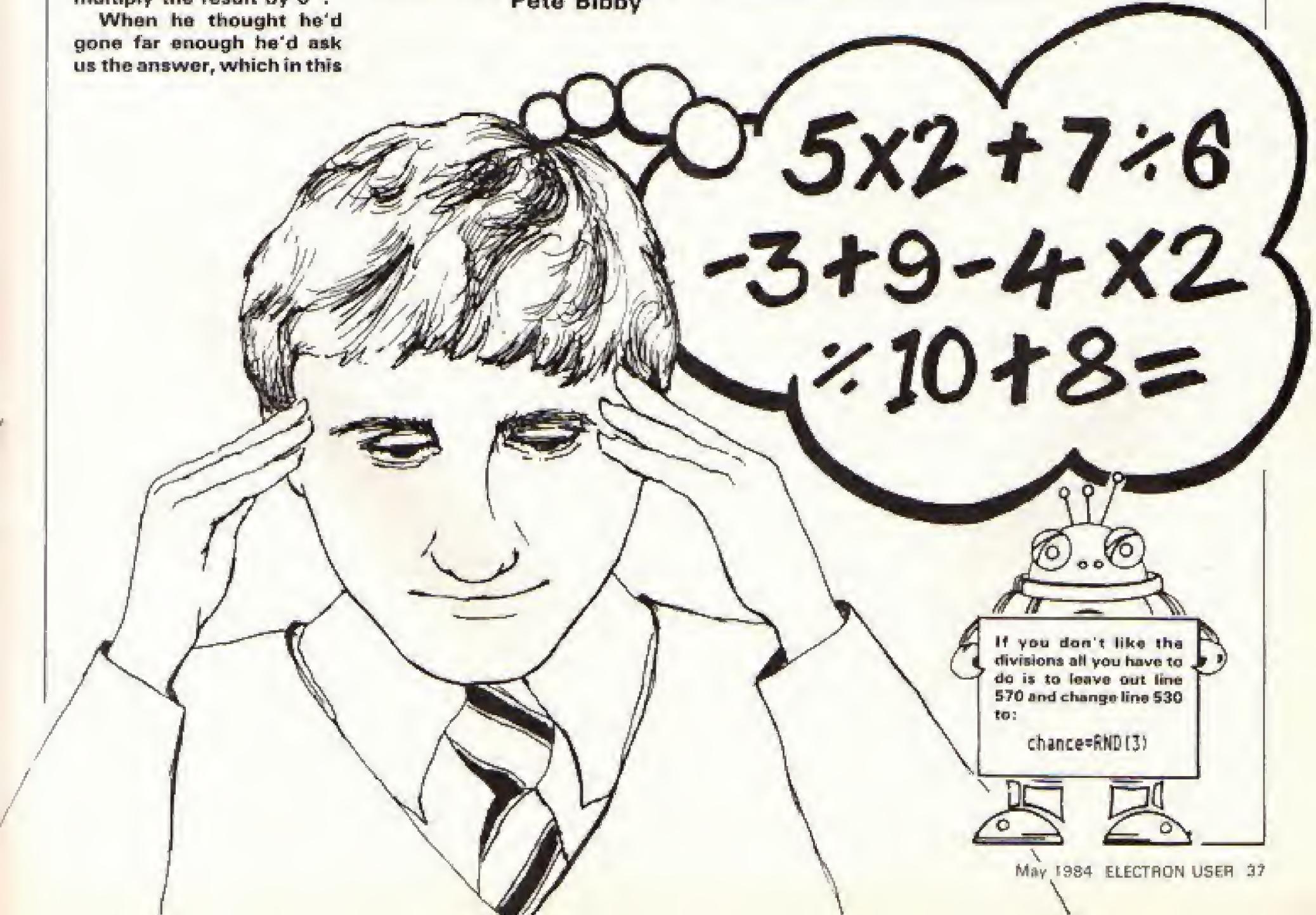
Pete Bibby

```

10 REM MATHS HIKE
20 REM (C) ELECTRON USER
30 REM by Pete Bibby
40 ON ERROR GOTO 90
50 MODE 6
60 VDU 19,0,4,0,0,0
70 VDU 23,1,0;0;0;0;
80 PROCinstruction
90 PROCinput
100 REPEAT
110 PROChike
120 PROCanster
130 WAIT#=GET#
140 CLS
150 UNTIL FALSE
160 END
170 DEF PROCinstruction
180 PRINT TAB(10,1) "A
Mathematical Hike"
190 PRINT TAB(10,2) "+-----+
-----"
200 PRINT TAB(7,4) "Your
Electron is now going"
210 PRINT TAB(7,6) "to
test you on your power
s"
220 PRINT TAB(7,8) "of
mental arithmetic."
230 PRINT TAB(7,10) "It
will think of a number
"
240 PRINT TAB(7,12) "and
then tell you to add"
250 PRINT TAB(7,14) "or
subtract or multiply
or"
260 PRINT TAB(7,16) "divide
it by the numbers"
270 PRINT TAB(7,18) "that
appear on the screen."
280 PRINT TAB(7,20) "Your
job is to try to keep"
290 PRINT TAB(7,22) "the
total in your head."
300 FOR delay=1 TO 2000
:NEXT delay
:CLS
310 ENDPROC
320 DEF PROCinput
330 CLS
340 REPEAT
350 INPUT TAB(3,5) "What
should be the largest
number?" TAB(20,7) limit#
360 IF limit#<1

```

Turn to Page 58

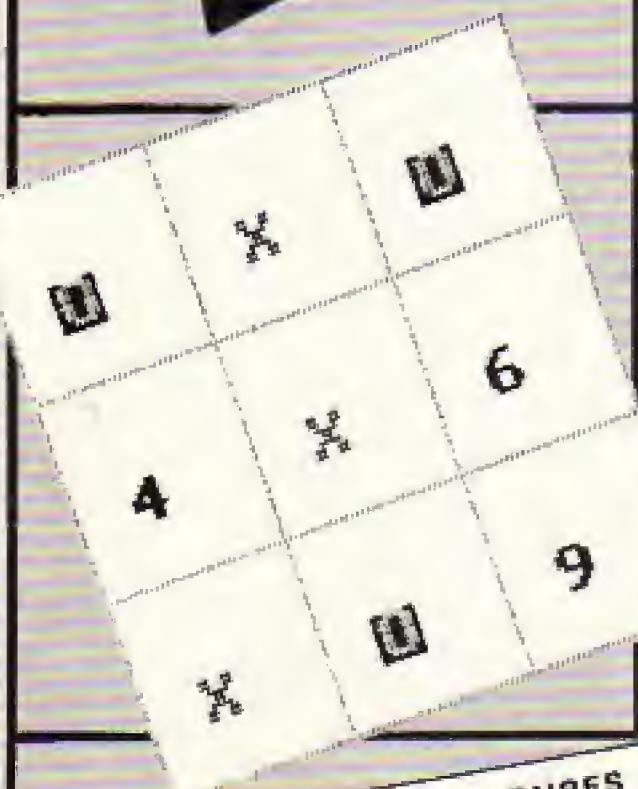


MARK SMIDDY adapts the classic game that keeps you on your toes...

Tic Tac Toe

Tic Tac Toe

Tic Tac Toe



ELECTRON Tic-Tac-Toe is another version of the age old game of noughts and crosses.

There's no pencil and paper though. You just pit your wits against the Electron.

There are two skill levels. The easiest is level 1. But to beat the Electron on level 2 is almost – but not quite – impossible.

MAJOR PROCEDURES

PROCins
PROCset
PROCcomputer
PROCrnd
PROCplayer
PROCX

PROCboard
PROCpieces
PROCinit

Prints up instructions.
Initialises start of each game.
Decides computer's move.
Makes random move for computer.
Gets and checks player's move.
Puts an 'O' into the Z\$(N) array, at the position pointed to by X, Y or Z.
Draws the board.
Draws the Os or Xs.
Sets up the computer for the start of play.
Defines the envelopes, and picks the initial colours.

MAJOR VARIABLES	
D%	Equals 0 if game ended.
L%	Equals TRUE if player lost.
N%	Used as a loop counter.
P%	Used as a loop counter.
W%	Equals TRUE if player won.
X%	X coordinate of O or X.
Y%	Y coordinate of O or X.
rnd	Equals TRUE if easy game selected.
win	Equals TRUE if computer could beat you.
block	Equals TRUE if computer could stop you.
X,Y,Z	Pointers to array elements.
x,y,z	Pointers to array elements.
Z\$(n)	Array holding all the pieces on the board.

MAJOR FUNCTIONS

FNtry(1\$)
FNt
FNtest

Returns TRUE if the string 1\$ is found using FNt.
Returns TRUE if three Os or three Xs are found in a row.
Returns TRUE if a free space is found in a line X, Y, Z.

Tic-Tac-Toe listing

```
10 REM TIC-TAC-TOE.  
20 REM by Mark Smiddy  
30 REM (C) ELECTRON USER  
40 MODE 1  
50 VDU 23,0,8202,0,0,0;  
60 PROCinit  
70 VDU 19,1,2,0;  
80 PROCins  
90 REPEAT  
100 CLS  
110 PRINT **Choose your  
skill level (1-2) **  
120 REPEAT
```

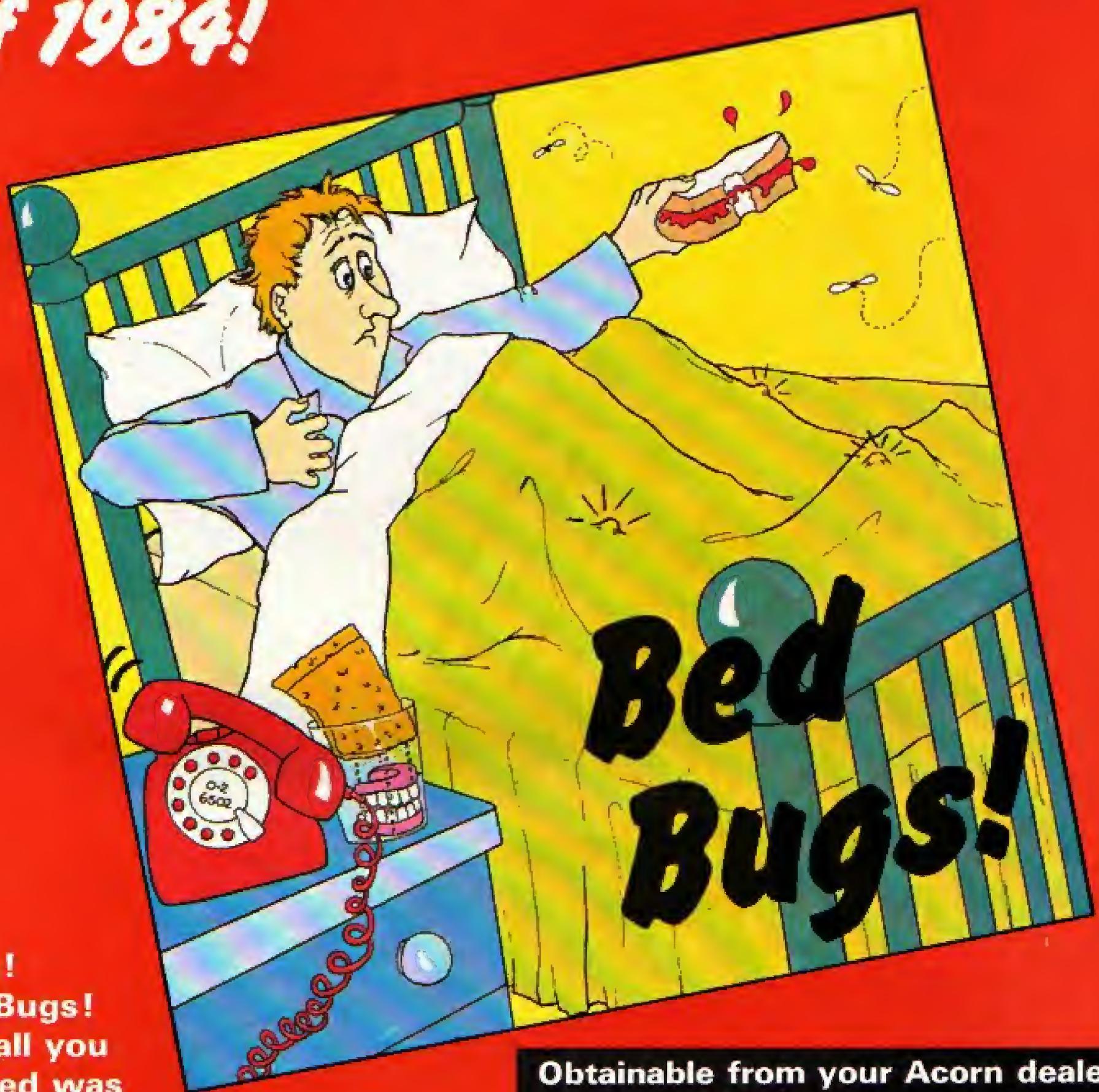
This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are given on Page 4 of the February issue.

```
130 rnd=GET -50  
140 UNTIL rnd=0 OR rnd=-1  
150 PROCset  
160 CLS  
170 PROCboard  
180 PROCoieces  
190 REPEAT  
200 D1=0  
210 PRINT  
220 PROColayer  
230 IF (L1=0 AND W1=0)  
PROCoieces
```

```
240 IF FNtry("X")COLOUR 3  
:PRINT TAB(0,18)**You  
win**  
:W1=1  
:SOUND $11,1,20,20  
250 FOR NZ=1TO 9  
260 IF Z$(NZ)=".," D1=D1+1  
270 NEXT  
280 IF D1=0 AND NZ=0  
COLOUR 3  
:PRINT TAB(0,18)**IT'S
```

Turn to Page 53

**You'll be ITCHING to get your
hands on the funniest program
of 1984!**



**Fleas!
Bed Bugs!
And all you
wanted was
a quiet night . . .**

The pests are after your feet and you'll have to move fast to stop them. Swot them with a jam sandwich or crunch them with your false teeth.

If you're desperate you can always phone for help. But whatever you do, do it quickly. You need cunning tactics and nimble fingers!

Bed Bugs guarantees hours of hilarity for the whole family.

**Obtainable from your Acorn dealer
or send in the coupon below**

ORDER FORM

Please send me BED BUGS:

- BBC 'B' cassette - £6.95
- Electron cassette - £6.95
- BBC 40-track disc - £8.95
- BBC 80-track disc - £8.95

Add 50p p&p
(post free 2 or more)

Name

Address

.....

I enclose cheque made payable to Optima Software Ltd.

I wish to pay by
 Access Visa

No

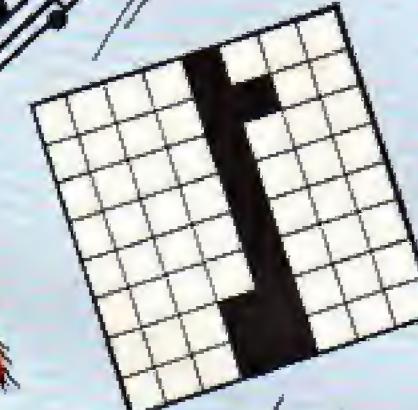
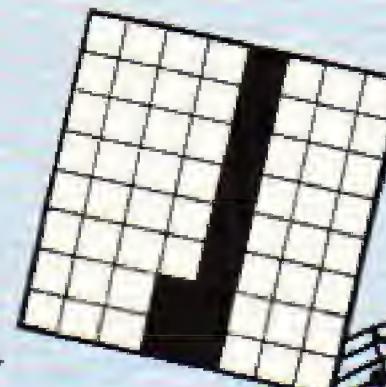
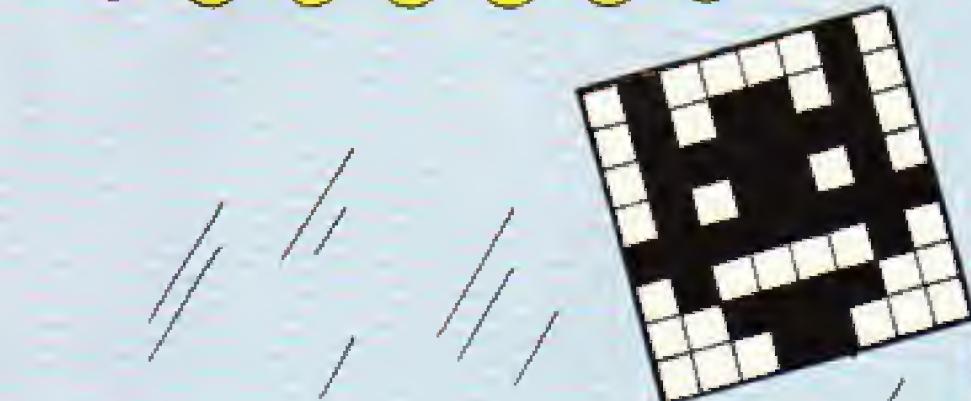
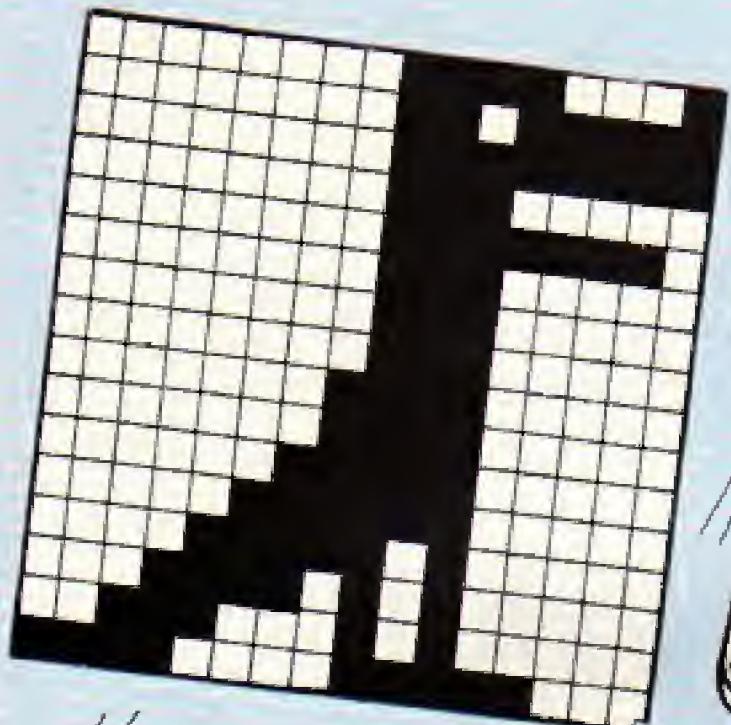
Signed

Expiry date



OPTIMA SOFTWARE

Casting Agency



Fred the Dragon

From Christopher Bingham
(Bristol)

VDU 23, 230, 241, 223, 255,
224, 254, 224, 224, 224

VDU 23, 231, 224, 224, 224,
224, 160, 160, 160, 240

VDU 23, 232, 1, 1, 3, 7,
15, 30, 56, 240

Television

From Andrew Oldham
(Camberley, Surrey)

VDU 23, 233, 127, 128, 191,
160, 160, 175, 162, 162

VDU 23, 234, 255, 0, 255,
1, 1, 165, 37, 37

VDU 23, 235, 254, 65,
65, 65, 81, 65, 81, 65

VDU 23, 236, 162, 162, 162,
162, 160, 191, 128, 127

VDU 23, 237, 37, 37, 61,
25, 1, 255, 0, 255

VDU 23, 238, 81, 65, 81,
65, 65, 93, 65, 254

Umbrella

From Matthew Swallow
(Lowdham, Notts)

VDU 23, 226, 24, 60, 126,
255, 16, 16, 16, 16

VDU 23, 227, 80, 112, 0,
0, 0, 0, 0, 0

Devil's Head

From Alan Lowdham
(Birmingham)

VDU 23, 225, 66, 90, 126,
90, 255, 66, 60, 24

A Quaver

From T. Stewart
(East Lothian)

VDU 23, 239, 8, 12,
9, 8, 8, 8, 24, 24

A Crotchet

VDU 23, 240, 8, 8, 8,
8, 8, 8, 24, 24



HAVE you a favourite character you would like to see in this monthly feature in Electron User?
Send your drawing of the character, together with the VDU23 statement, to: Shape Dictionary, Electron User, Europe House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

HIT THE *Jackpot*

By JAMES ROOK

Fruit Machine turns your Electron into a one armed bandit.

You start out with £1 and each spin costs you 10p.

Are you a winner or a loser? Play the Electron Fruit Machine and see.

**FRUIT
MACHINE**
A A A WINS 70P
A A - WINS 30P
A A - WINS 15P
A - - WINS 5P

10P = 1 PLAY

You begin with £1.00
You have got 95p left
Press 'Y' to insert coin.
Press 'N' to end the game.

BIG FRUITY

INSERT COIN



PROCEDURES

PROCINIT Sets up the envelopes, defines the characters and displays the winning combinations and the game status.

PROCSET Draws the fruit machine's outline and prints the relevant text inside it.

PROCPOS Works out the starting point for the drum.

PROCSPIN Spins the drum.

PROCPAY_OUT Pays out the money with the appropriate sounds.

PROCJACKPOT Pays out the jackpot with the appropriate sound and wording.

PROCBROKE Tells you when all your money has gone and asks if you want another go.

PROCDEBT Tells you how much money you have in negative form ("You have -20p left") and then asks if you want another go.

```

10 REM FRUIT MACHINE
20 REM BY J.ROOK
30 REM (C) ELECTRON USER
40 MODE 4
50 PROCINIT
60 M=100
70 PROCSET
80 PRINT TAB(23,9);"
    ";TAB(23,10);
    "COIN";TAB(23,11);
    "INSERTED"
90 PROCPOS
100 M=M-10
110 PROCSPIN
120 PROCPAY_OUT
130 IF M<0
    THEN PROCDEBT
140 IF M=0
    THEN PROCBROKE
150 PRINT TAB(25,13);"
    "
160 PRINT TAB(23,19);"
    "
170 PRINT TAB(0,22);"You
begin with £1.00"
180 PRINT "You have got
";M;"p left";SPC (3)

190 PRINT TAB(23,11);"
    ";TAB(23,9);
    "INSERT";TAB(23,10);
    "COIN"
200 PRINT TAB(0,26);"Press
'Y' to insert coin."
210 PRINT "Press 'N' to
end the game."
220 A$=GETS
230 IF A$="N"
    THEN GOTO 250
240 IF A$="Y"
    THEN SOUND 1,-15,150
    ,5
    :GOTO 70
250 PRINT "You end the
game with ";M;"p"
260 END
270 DEF PROCPOS
280 X=(RND(4)-1)*10+1
290 Y=(RND(4)-1)*10+1

300 Z=(RND(4)-1)*10+1

310 ENDPROC
320 DEF PROCSPIN
330 S=RND(2)+2
340 FOR I=0 TO S*10
350 VDU 23,229,C(X),C(X)
    ,C(X+1),C(X+1),C(X+2)
    ,C(X+2),C(X+3),C(X+3)
360 VDU 23,232,C(X+4)
    ,C(X+4),C(X+5),C(X+5)

```

```
,C(I+6),C(I+6),C(I+7)
,C(I+7)
370 VDU 23,230,C(Y),C(Y)
,C(Y+1),C(Y+1),C(Y+2)
,C(Y+2),C(Y+3),C(Y+3)
```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are given on Page 4 of the February issue.

```
380 VDU 23,233,C(Y+4)
,C(Y+4),C(Y+5),C(Y+5)
,C(Y+6),C(Y+6),C(Y+7)
,C(Y+7)
390 VDU 23,231,C(Z),C(Z)
,C(Z+1),C(Z+1),C(Z+2)
,C(Z+2),C(Z+3),C(Z+3)
400 VDU 23,234,C(Z+4)
,C(Z+4),C(Z+5),C(Z+5)
,C(Z+6),C(Z+6),C(Z+7)
,C(Z+7)
410 PRINT TAB(24,15);
CHR$ (229);" ";
CHR$ (230);" ";
CHR$ (231)
420 PRINT TAB(24,16);
CHR$ (232);" ";
CHR$ (233);" ";
CHR$ (234)
430 IF I=40
THEN I=0
440 IF Y=40
THEN Y=0
450 IF Z=40
THEN Z=0
460 X=I+1
:Y=Y+1
:Z=Z+1
470 NEXT I
480 I=I-1
:Y=Y-1
:Z=Z-1
490 ENDPROC
500 DEF PROCPAY_OUT
510 IF I=1 AND Y=1
AND Z=1
THEN PROCJACKPOT
:ENDPROC
520 IF (I=31)+(Y=31)+(Z=31)
=-2
THEN M=M+15
:PRINT TAB(25,13);
"15p"
:A$=INKEY$ 300
:SOUND 1,3,148,22
:ENDPROC
530 IF (I=21)+(Y=21)+(Z=21)
=-2
THEN M=M+30
:PRINT TAB(25,13);
"30p"
:A$=INKEY$ 300
:SOUND 1,3,148,44
:ENDPROC
```

```
540 IF (I=1)+(Y=1)+(Z=1)=-1
THEN M=M+5
:PRINT TAB(26,13);
"5p"
:A$=INKEY$ 300
:SOUND 1,3,148,7
:ENDPROC
550 ENDPROC
560 DEF PROCINIT
570 ENVELOPE 3,2,-25,-80
,-6,15,0,0,126,0,0
,-126,126,126
580 ENVELOPE 1,3,-17,61
,9,4,0,0,126,0,0,-126
,126,126
590 VDU 23,224,406,40A
,414,424,444,4CF,4EF
,4E6
600 VDU 23,225,402,40C
,41C,438,438,41C,40C
,402
610 VDU 23,226,418,43C
,43C,43C,47E,4FF,418
,418
620 VDU 23,227,40C,418
,47A,4FF,4FF,4FF,47E
,43C
630 VDU 23,228,400,400
,400,47E,47E,400,400
,400
640 VDU 23,235,255,153
,165,195,195,165,153
,255
650 VDU 23,1;0;0;0;0
660 PRINT TAB(0,1);"F R
U I T"
670 PRINT "-----"
680 PRINT "M A C H I N
E"
690 PRINT "-----"
700 PRINT TAB(0,5);
CHR$ (224);" ";
CHR$ (224);" ";
CHR$ (224);" WINS 70p"
710 PRINT "CHR$ (226);
" ;CHR$ (226);" -
WINS 30p"
720 PRINT "CHR$ (227);
" ;CHR$ (227);" "
" ;" WINS 15p"
730 PRINT "CHR$ (224);"
```

```
"p left"
1060 PRINT ""
1070 PRINT TAB(0,26);"You
are in debt!"
1080 PRINT ""
1090 INPUT TAB(0,28);"Do
you want another go
",A$
1100 A$=LEFT$(A$,1)
1110 IF A$="N"
THEN END
1120 IF A$="Y"
THEN RUN
1130 ENDPROC
1140 DEF PROCSET
1150 PRINT TAB(0,24);"
1160 PRINT ""
1170 PRINT ""
1180 MOVE 640,352
:DRAW 640,864
:DRAW 1024,864
:DRAW 1024,352
1190 DRAW 640,352
:MOVE 1024,448
:DRAW 1072,448
:DRAW 1072,800
1200 DRAW 1088,832
:DRAW 1072,864
:DRAW 1056,864
:DRAW 1040,832
1210 DRAW 1056,800
:DRAW 1072,800
:MOVE 1056,800
:DRAW 1056,448
:DRAW 1056,448
1220 MOVE 1056,480
:DRAW 1024,480
:MOVE 752,448
:DRAW 752,544
1230 DRAW 944,544
:DRAW 944,448
:DRAW 752,448
1240 PRINT TAB(21,6);"BIG
FRUITY"
1250 PRINT TAB(21,7);"-----
1260 PRINT TAB(21,9);
CHR$ 235
1270 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 47

IN the first of the series (*Electron User*, March 1984) we looked at what specifies a memory location. Most memory locations address either RAM or ROM, so this month we'll talk about exactly what they are.

Each memory location contains eight bits, or one byte, of information. We need two types of memory as they each have different properties.

ROM stands for Read Only Memory. The address locations that contain ROM cannot be altered by the computer. They are fixed at the time the chip is made.

The designers of the ROM have to give the manufacturers a tape of the required contents. Then the bit pattern for each address is built into the ROM chip.

This makes them very expensive initially, as the manufacturers incur a lot of expense tooling up.

But if the chips are to be made in any quantity the tooling charge amounts to a small fraction of the total cost of the device.

ROM is a very English type of memory — that is, it is non-volatile.

In other words it keeps its head and will retain what is placed in it even when the power is removed.

Look out for ROMs.

This makes it ideal for storing programs and data which have to be instantly available every time the computer is switched on.

In the Electron this means the program which allows the computer to understand Basic program statements as well as data such as the shape of the letters and numbers you see on the screen.

The ROM in the Electron takes up 32k of address space — that is half the total available memory.

The advantage of this is that the version of Basic it contains is very powerful and so you don't need so much room for your program as you would on other machines.

The rival Spectrum is advertised as having a massive memory, but in fact it is no bigger than the Electron's.

The only difference between them is the proportion of ROM to RAM.

RAM stands for Random Access Memory, which makes life a little confusing at first as ROM memory can also be accessed randomly. It means that address locations can be

read in any order.

The name is really a hangover from the days when all forms of read/write memory could only be accessed sequentially.

The contents of this memory were constantly circulating and you had to wait before the required address appeared through a small "window" before you could get it.

This was in the days of large mainframe computers which only ran batch programs from punched cards. They were not interactive like the Electron.

So you see that the word RAM describes the sort of memory which can be altered by the user.

RAM is volatile. That is, when the power is removed it will forget whatever was stored in it.

As it is used to store your programs, you'll see that they will need to be loaded in every time the Electron is switched on.

This is why there is a tape recorder output on most computers to enable programs to be loaded rapidly.

When RAM is first powered up, it will contain a collection of zeros and ones known as "rubbish". This is because they have no significance and the contents cannot be predicted.

It is true that any individual device tends to power up with the same rubbish every time and with different devices the rubbish is different.

The Electron usually clears out most of its memory on power-up. But the memory which contains the single letter integer variables, such as A%, B% is left untouched. On switch-on these will contain rubbish.

Due to the nature of the type of memory used you will tend to get the value of zero (all memory locations logic zero) or minus one (all memory locations one).

Try printing these out just after switch-on, but remember they are likely to be different on other Electrons.

There are two types of RAM — static and dynamic.

Static RAM can be thought of as consisting of a number of buckets, either containing



.. and RAMs

water or empty (logic one or zero).

The buckets can be looked into to see what they contain when the memory location is read. When the power is switched off, they all get jiggled about and the water sloshes all over the place.

Now dynamic RAM, the type in the Electron, works in the same way except that the buckets are leaky, and they have to be constantly looked

at and topped up if necessary.

This has to be done about 500 times a second and is known as refreshing.

Fortunately lots of buckets can be refreshed at the same time and so only 128 locations need to be refreshed.

Even so, each one of these must still be refreshed 500 times a second.

If the memory were not refreshed its contents would "leak" away.

You may ask: "Why bother with dynamic RAM with its need to be constantly refreshed when static RAM is available?"

Well if you think about it, it

WHAT'S THAT WHEN IT'S AT HOME?

MIKE COOK explains the inner workings of the Electron **Part 2**



takes less material to make a leaky bucket than it does to make a sound one. Exactly the same applies for RAM.

There are fewer components making up dynamic RAM, so you can pack more of them onto a chip.

As the cost of making a chip is the same whether it contains static or dynamic RAM, you get more memory for your money.

In addition, dynamic RAM uses less electricity, and so it does not get as hot or need such big power supplies.

If you are going to have more than just a few k of memory it makes economic sense to use dynamic RAM.

Now the Electron uses the latest type of dynamic RAM with 64k address locations in each package.

Each package contains one bit of information, so to get a byte you would need eight packages.

However that would give you 64k of memory and as we have already said, the ROM occupies 32k of the total 64k maximum memory locations.

To get round this the

Electron has only four packages of RAM, and each one is accessed twice to build up one byte.

Extra electronics look after this so that the computer is not aware it is happening.

The only snag is that as you have to look at the RAM twice to get a byte it takes twice as long.

The computer's overall speed is governed by how fast the memory can be read. This is known as the memory access time.

Only RAM memory accesses are slowed down in this way. ROM is read at full speed, which explains why the Electron is only about 40 per cent slower than the BBC Micro.

You can only say "about" because this depends upon the proportion of RAM to ROM the computer is accessing, and this will depend on the program being executed.

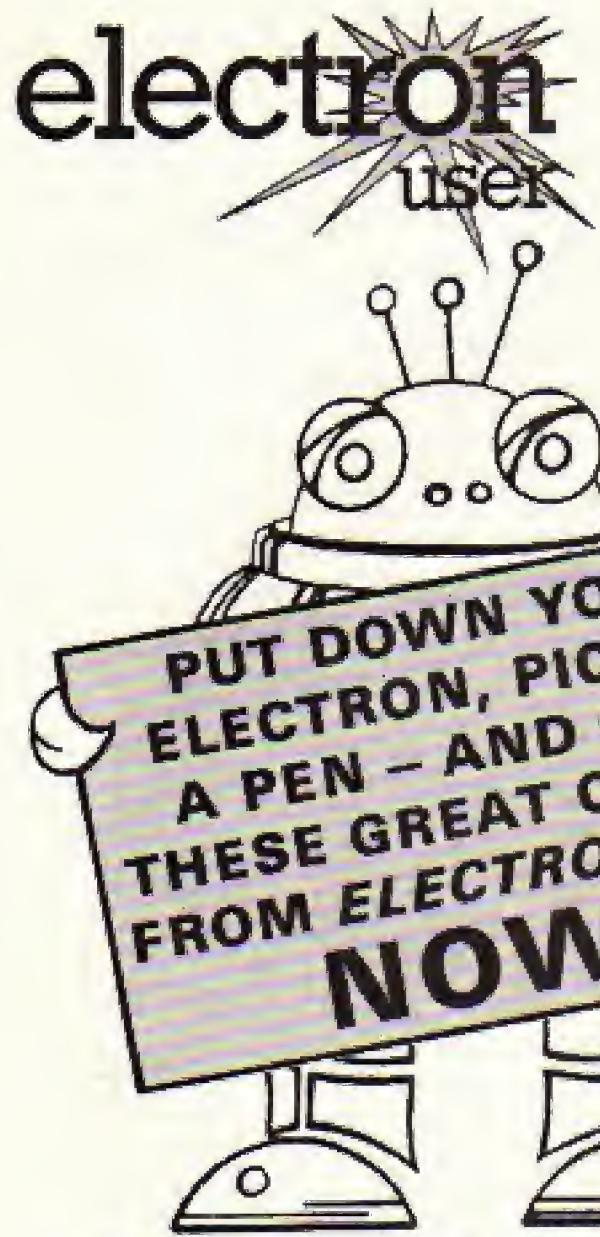
So there you have it - two types of memory: ROM for keeping permanent information, and RAM for keeping temporary or changing information.

There is a device which combines the best of these two called non-volatile RAM. But at the moment it is only available with very small capacities and is very expensive.

No doubt it will be incorporated into most computers, but not, I suspect, for the next 10 years.

Next time we will be looking at the microprocessor itself and seeing exactly what it does.





Be one of the first to get each issue

A subscription will ensure you get your own personal copy HOT OFF THE PRESSES month after month for the next year.

Every owner of an Electron – and everyone thinking of buying one – needs to get Electron User every month. It's the brightest, most authoritative yet completely independent guide to a machine that has so much potential you will never tire of reading about its remarkable capabilities.

You can buy Electron User from your local newsagent or station bookstall. Or you can take out a 12 months subscription and have it delivered to you by post.



Your Electron needs protecting!

Protect your Electron with our luxury dust cover made of soft pliable water-resistant vinyl, bound with strong cotton and decorated with Electron User logo.

£3.95



Keep your collection of *Electron User* complete with these handsome binders

Bound in attractive red pvc with the *Electron User* logo in gold blocking on the spine, this binder will hold 12 magazines firmly secured in place by metal rods.

£3.95

FREE**Cassette worth
£3.75 if you
subscribe NOW!**

If you take out a subscription to *Electron User* now you will receive completely free one of the monthly cassettes of *Electron User* listings. Choose which one you want from those illustrated below.

This free gift is for a limited period, so subscribe now!

Cassette tapes of *Electron User* programs

Save typing in programs from *Electron User* by sending for these program-packed tapes.

£3.75 each



ORDER FORM

All prices include postage, packing and VAT, and are valid to May 25.

Please enter number required in box

E P

Electron User

annual subscription

UK £12

EIRE £13 (IR £16)

Overseas (Surface) £20

Overseas (Airmail) £40

Selected free cassette _____ (month)

Commence with _____ issue TOTAL _____

Electron User

introductory issues

Complete set of 4

£1.50 UK

£1.75 Overseas (Surface)

TOTAL _____

Electron User

back issues

February

March

April

TOTAL _____

Electron User tapes

£3.75

(UK & Overseas)

26 introductory programs

Lunar Lander, February

Chicken, March

Spacehike, April

Rally Driver, May

TOTAL _____

Cassette tape

annual subscription

TOTAL _____

£40 (UK & Overseas)

Commence with _____ tape (state month) TOTAL _____

Dust Cover

£3.95

(UK & Overseas)

TOTAL _____

Binder

£3.95 UK

£5.00 Overseas

TOTAL _____

Payment: please indicate method (✓)

TOTAL _____

Access/Mastercharge/Eurocard

Barclaycard/Visa

American Express

Card No. _____

Expiry Date _____

Cheque/PO made payable to Database Publications Ltd

Name _____

Address _____

Signed _____

Send to: *Electron User*, FREEPOST, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

(No stamp needed if posted in UK) Please allow 28 days for delivery

You can also order by phone

Telephone:

061-480 0171

24 hours

Don't forget to quote your credit card number and give your full address

Get yourself involved with PETER GREY's

SHADY CHARACTERS

HAVE you ever had a go at designing user-defined characters like the ones that appear in Casting Agency each month?

They take quite a lot of thought, effort, and planning with pencil and paper.

Being fairly lazy, I wondered if there was some way I could get my Electron to do the work for me and create some user-defined characters.

The three programs in this

Each character has eight lines making it up, so if we get the Electron to generate eight random numbers and put them behind a VDU 23, the result is a purely random user-defined character.

This is what PROCcharacter does in Program I. It generates eight random numbers and stores them in an array.

PROCshade picks a random foreground and background

I wondered if I could do the same sort of thing using the graphics command GCOL instead of PRINTing the character each time. I came up with Program II:

This uses the same two procedures, only PROCshade is but a shadow of its former self!

The GCOL 0 that I use just prints the foreground colour, so I left the background as black.



Screen from Program I

multicoloured background like I had in Program I?

I would have to print at exactly the same spot twice, once in one colour, then again in a second.

Also, as I was using GCOL, the colours mustn't overlap. This meant that the user-defined (or, rather, Electron-defined) characters had to be the reverse of each other.

One must have its foreground colour where the other has its background colour and vice versa.

Program III shows the result of my deliberations:

It's very similar to Program II, only now PROCshade has some of its former glory, picking two colours.

PROCcharacter defines two characters, the second being the opposite of the first.

The main program prints the two together at the same spot on the screen. Figure II shows how it's done.

Those are the three programs that came from being too idle to create my own characters.

The patterns are nice, but it

128 + 0 + 0 + 0 + 0 + 0 + 0	96
0 + 64 + 32 + 0 + 0 + 0 + 0	24
0 + 0 + 0 + 16 + 8 + 0 + 0 + 0	5
0 + 0 + 0 + 0 + 0 + 4 + 0 + 1	80
0 + 64 + 0 + 16 + 0 + 0 + 0 + 0	224
128 + 64 + 32 + 0 + 0 + 0 + 0 + 0	6
0 + 0 + 0 + 0 + 0 + 4 + 2 + 0	9
0 + 0 + 0 + 0 + 8 + 0 + 0 + 1	

Figure I: Calculations for user-defined characters

article came from that idle speculation.

If you look at Figure I you'll see that it's the usual way of calculating a user-defined character. You add up each of the rows and get a number between 0 and 255.

"Why not", I asked myself, "use the RND function to produce a random number for each line?"

colour for the character, making sure that the two are not the same.

The program runs in Mode 2 and the FOR...NEXT loop calls the two procedures over and over, filling the screen with coloured, random characters.

The trouble is that the bottom line scrolls up, spoiling the effect.

The program works very much as before; a FOR...NEXT loop filling the screen with the randomly shaped and coloured characters.

The difference is that now graphics commands are used, so the loop parameters have different values.

Again I wasn't satisfied. The black background was all very nice, but couldn't I have a

```

10 REM PROGRAM I
20 MODE 2
30 DIM byte(8)
40 FOR row=0 TO 19
50 FOR line=0 TO 30
60 PROCshades
70 PROCcharacter
80 COLOUR colour
90 COLOUR backcolour
100 PRINT TAB(row,line)
    CHR$(224)
110 NEXT line
120 NEXT row
130 END

```

```

140 DEF PROCcharacter
150 FOR generator=1 TO 8
160 byte(generator)=RND(256)-1
170 NEXT generator
180 VDU 23,224,byte(1),byte(2)
    ,byte(3),byte(4),byte(5)
    ,byte(6),byte(7),byte(8)
190 ENDPROC
200 DEF PROCshades
210 colour=RND(8)-1
220 backcolour=RND(8)+127
230 IF colour=backcolour
    THEN PROCshades
240 ENDPROC

```

```

10 REM PROGRAM II
20 MODE 2
30 VDU 5
40 DIM byte(8)
50 FOR row=0 TO 1279
    STEP 64
60 FOR line=0 TO 1023
    STEP 32
70 PROCshades
80 PROCcharacter
90 GCOL 0,colour
100 MOVE row,line
    ;VDU 224
110 NEXT line

```

```

120 NEXT row
130 END
140 DEF PROCcharacter
150 FOR generator=1 TO 8
160 byte(generator)=RND(256)-1
170 NEXT generator
180 VDU 23,224,byte(1),byte(2)
    ,byte(3),byte(4),byte(5)
    ,byte(6),byte(7),byte(8)
190 ENDPROC
200 DEF PROCshades
210 colour=RND(7)
220 ENDPROC

```

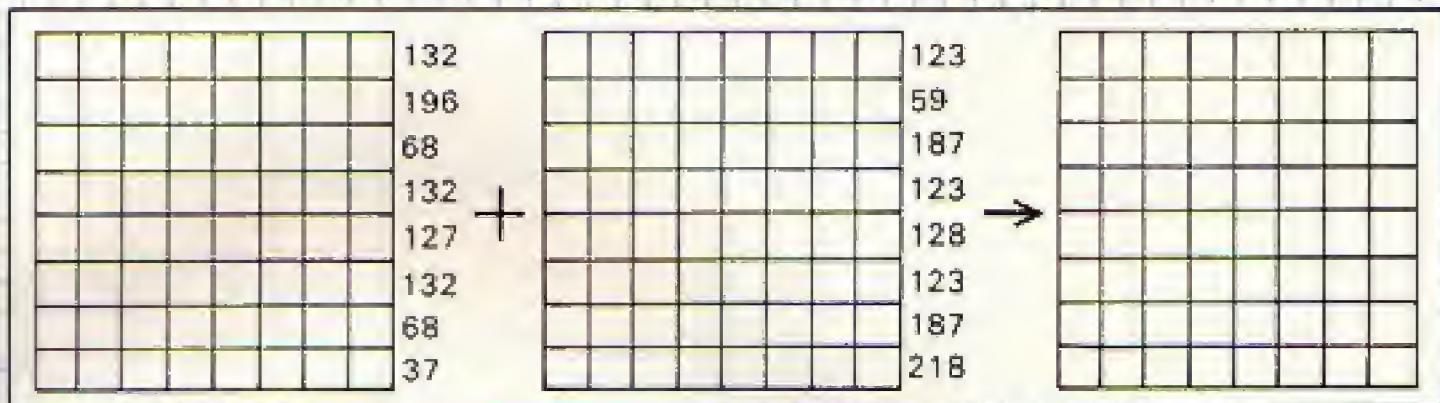
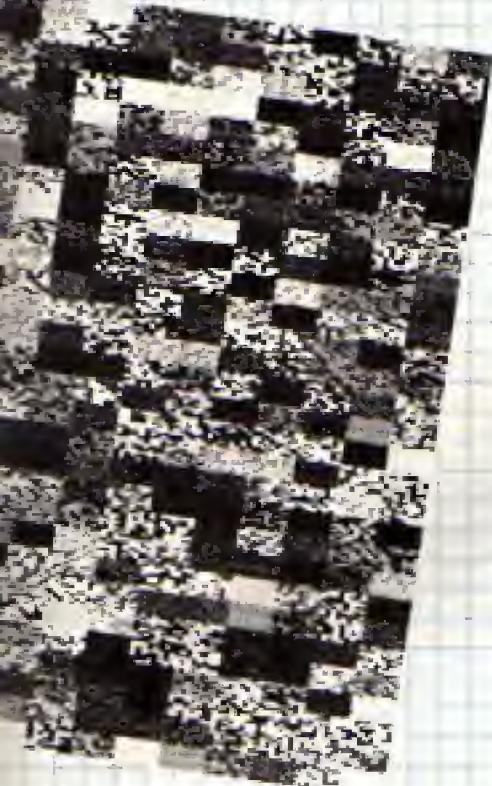


Figure II: How the random characters combine

was the programming that gave the satisfaction. And it isn't finished yet.

I wonder how I can get the final pattern to flash?

It'll be something using random VDU 19s in a REPEAT...UNTIL loop. The trick will be avoiding using the same colour for foreground and background.

I wonder...

```

10 REM PROGRAM III
20 MODE 2
30 VDU 5
40 DIM byte(8)
50 FOR row=0 TO 1279
    STEP 64
60 FOR line=0 TO 1023
    STEP 32
70 PROCshades
80 PROCcharacter
90 GCOL 0,colour1
100 MOVE row,line
:VDU 224
110 GCOL 0,colour2
120 VDU 8,225
130 NEXT line
140 NEXT row
150 END
160 DEF PROCcharacter
170 FOR generator=1 TO 8
180 byte(generator)=
    RND(256)-1
190 NEXT generator
200 VDU 23,224,byte(1)
    ,byte(2),byte(3),byte(4)
    ,byte(5),byte(6)
210 VDU 23,225,255-byte(1)
    ,255-byte(2),255-byte(3)
    ,255-byte(4),255-byte(5)
    ,255-byte(6),255-byte(7),255-byte(8)
220 ENDPROC
230 DEF PROCshades
240 colour1=RND(8)-1
250 REPEAT
:colour2=RND(8)-1
:UNTIL colour2<>colour1
260 ENDPROC

```

Make your Electron a lovely mover

MAKE your Electron really move with Mark Smiddy's short but powerful program, Rotation.

```

10 REM ROTATE
20 REM BY MARK SMIDDY
30 REM (C) ELECTRON USER
40 MODE 2
50 PROCdraw(640,512)
60 PROCdraw(640,-512)
70 PROCdraw(-640,-512)
80 PROCdraw(-640,512)
90 PROCdraw(0,0)
100 PROCrot
110 DEF PROCdraw(XZ,YX)
120 VDU 29,640;512;
    :MOVE XZ,YX
    :NZ=0
    :RX=120
    130 FOR I = 0 TO 2*PI
        STEP 0.1
        140 GCOL 0,NZ
150 MOVE XZ,YX
160 PLOT 85,RX*COS I,RX*
    SIN I
170 NEXT
180 ENDPROC
190 DEF PROCrot
200 VDU 20
210 REPEAT
220 DZ=0
230 FOR DZ=1 TO 7
240 FOR CZ=1 TO 15
250 FOR N=0 TO 40
    :NEXT
260 VDU 19,CZ,DZ;0;
270 NEXT :NEXT
280 UNTIL 0
290 ENDPROC

```

MRM SOFTWARE



DIAMOND MINE

An absolutely fascinating and compulsive game designed to test your skills of dexterity and coordination. Steer the lengthening pipe to the diamonds buried deep in the depth of the diamond mine. But be careful avoid hitting the walls with the pipe and watch out for those monstrous menacing meanies... the bugs.

Have you enough pipe left to collect all the diamonds? Have you got steady hands? Find out with this sparkling gem from MRM.

ONLY £5.70
Enclose 55p p&p
per order

"Simple game, but quite a find for all that".
"This is one of those surprising little games that always manages to tempt you back for another go".
Computer Games, March 1984



MRM SOFTWARE
17 Cross Coates Road
GRIMSBY
South Humberside
Telephone: 0472 44304

Dealers telephone
now for
dealer prices

Software Surgery

THE COLUMN THAT TAKES A LOOK INSIDE THE LATEST RELEASES

Great way to experiment with graphics

ELECTRON GRAPHICS

Salamander Software

THE Electron is capable of supporting a wide range of graphics and text modes, better in fact than many machines costing much more.

Imaginative programming can be carried out in Modes 0, 1 and 2, although many people would find the GCOL, MOVE, DRAW and PLOT statements difficult to plan for an involved drawing.

This program takes the difficulty away, substituting it with a series of simple commands with which complicated, colourful and concise artwork can be designed.

Only Modes 0, 1 and 2 can be used, and the available colours are shown on a palette at the bottom of the screen.

Should other colours than the default one be required it is simple to alter those available.

A flashing cross-hair cursor is used to position elements, and the coordinates are constantly updated on-screen.

A number of built-in functions can be used, and each has an easily remembered mnemonic. B draws a box, C sets a circle, F fulfills a FILL function, L produces a line while A initiates an arc.

For all these, when the cursor is in the correct position, the Spacebar is the input necessary to start the procedure.

Text can be added at will on the screen, and so many applications spring to mind.

Pie charts and histograms may be labelled and coloured to relay information, systems may be designed, and complicated maps and drawings

transferred from graph paper.

Pictures may be built up in a series of pages and may be stored onto cassette for future use.

One glaring omission, looking to the future, is that there seems to be no facility for a screen dump.

A hard copy of the screen display would be a fitting final facility to this useful piece of software.

It fulfills a large variety of purposes, and also stands on its own as great fun with which to experiment.

Phil Taylor

Fast mover

POSITRON

Program Power

YOU'VE seen it all before. The space invaders tramp predictably across the screen, edging relentlessly earthwards.

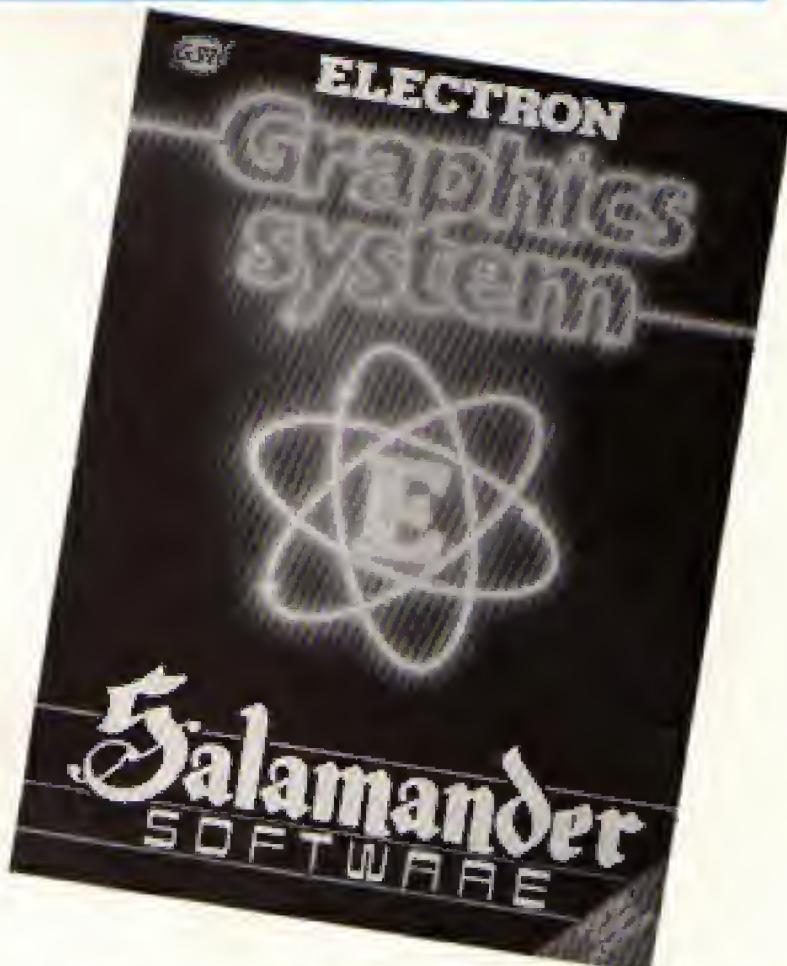


Learning can be fun

10 EDUCATIONAL GAMES

Dimax Structured Software

WHENEVER I see a compendium tape my reaction is to shudder. There is usually one



You wipe them out mercilessly with your quick firing laser base, rapidly clearing the first screen.

It appears all too easy – then all hell breaks loose...

The second wave doesn't follow a set pattern. They swarm about all over the place setting up defensive boxes. If you don't break them up they will be your downfall.

Moving quickly earthwards they have landed before you can gather your shattered wits.

And that's only the second wave – there are nine in all, each progressively worse.

Positron is a fast moving, colourful and satisfying game. So sharpen your wits, tighten your sweatband and give it a whirl.

Adam Young

reasonable program surrounded by a heap of others which vary from bad to awful.

This one, however, is a pleasant exception, containing 10 programs aimed at the user in school.

One superb innovation is that Dimax makes the listing freely available. Each program uses the same standard programming format so that the listing can be adapted to suit special needs.

Indeed, Dimax will even sell the listings separately for just 40p each should your typing not be up to Olympic standard.

The games cover mathematical themes, letter recognition and a stiff test on capital cities. There are also quite reasonable versions of standard games such as Mastermind and Simon.

While none of the ideas is especially original, the versions are well enough programmed to give interesting screen displays.

There is even a version of Tree of Knowledge, a simple introduction to the setting up of a datafile.

For less than the price of a normal commercial program this tape offers a wide range of

From Page 51

educational games which can be freely adapted. Indeed, there are even suggestions printed on the inlay of ideas to try.

Many parents will also find this a worthwhile purchase.



especially as it has been written to run on both the Electron and the BBC Micro.

My main criticism is that the Electron is a sophisticated machine which can use colour, detail, sound and animation to stimulate children using the machine.

I am not convinced that Max Lang has exploited this to the full.

Philip Tayler

Hang about - it's an old favourite

HANGMAN

IJK Software

WELL, they did it with Battleships, Gomoku, Othello and even Chess. So why shouldn't they put a really professional version of Hangman on the Electron?

IJK Software have taken this pencil and paper game and turned it into a highly enjoyable video pastime which can be enjoyed by all the family - something rare in video games today.

The graphics are excellent, especially the hanging man, and also colourful. It all adds to the enjoyment of the game.

They have gone into great detail with the victim. He blinks, smiles and clicks his fingers. And if you take too

long in contemplating your next choice of letter he will give you quite a surprise.

Forseeing the time when you have learned all the names in each category, there is a section where you can include

words of your own choice.

All in all, a simple, good value down-to-earth game and a refreshing change from a screenful of laserbolts and gore.

Adam Young

You'll need a lot of bottle

KINGDOM OF KLEIN

Epic Software

THIS is the latest in a series of text-only adventures for the Electron from Epic.

The plot concerns the wicked witch of the mountain who has stolen the Klein bottle from its pedestal in the king's palace.

She has sworn to lay a hideous curse on anyone foolish enough to try to recover it. And the hapless

citizens of Klein have elected you to be that fool!

Your task is to find and kill the witch and return the bottle to the pedestal.

You start at the scene of the crime and after collecting some useful items in the palace set out on your quest.

You have a limited amount of movement before encountering the first puzzle - how to cross the river. But having solved this, off you go to the main body of the adventure.

I won't reveal anything else about the game itself. Suffice to say you will meet a belligerent giant, learn to fly and end up in an endless maze.

I consider this a fairly hard adventure, and I must confess I decided to cheat. Imagine my surprise, however, when I found a message in the memory to the effect that

"peaking won't help, you'll have to do it the hard way!"

Thus chastened, I returned to the adventure, got a little further and got stuck... again.

This time I wouldn't be beaten. A slight alteration to the Ascii values in my disassembler produced a keywords listing. Thus armed, I hastened back to the game and promptly got stuck yet again.

As I write this, I am finally near the end - the adventure's and mine. The effort has been worthwhile, even though I now have a few grey hairs.

Overall a definite must for the experienced adventurer, though the beginner would probably do better with the first of the Epic adventures, Castle Frankenstein.

The save-game facility and response to keyboard input are both very fast.

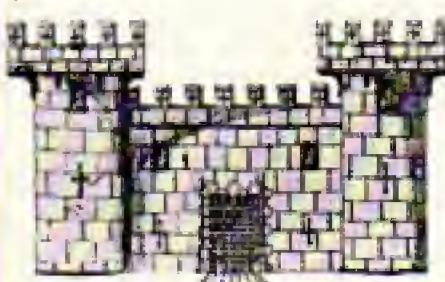
Electron User index of software reviewers

Castle Frankenstein (Epic Software)	Apr 1984
Catapult (IJK Software)	Apr 1984
Craze (Program Power)	Apr 1984
Cybernet Mission (Program Power)	Apr 1984
Cyber Attack (A&F Software)	Jan 1984
Draughts & Reversi (Acornsoft)	Dec 1983
Draw (Micro Power)	Feb 1984
Electron Chess (Program Power)	Mar 1984
Felix at the Factory (Program Power)	Jan 1984
Grovley Grammar Games (Magic Software)	Dec 1983
Homescapes (Third Program)	Jan 1984
Kamikaze (A&F Software)	Apr 1984
Minotaur (Acornsoft)	Oct 1983
Monsters (Acornsoft)	Oct 1983
Moob Raider (Program Power)	Mar 1984
Pharaoh's Tomb (A&F Software)	Mar 1984
Pancman (Chelksoft)	Feb 1984
Starship Command (Acornsoft)	Dec 1983
Supergal (Squid Software)	Mar 1984
Swings (Program Power)	Dec 1983
Tree of Knowledge (Acornsoft)	Dec 1983
What Makes You Tick? (Third Program)	Feb 1984

A lot of mapping is required and although the solutions to the problems are reasonably easy, finding what you need to solve the problem with can be a headache.

An extremely good adventure and excellent value for money. Recommended.

Merlin



Tic-Tac-Toe listing

From Page 38

```

A DRAW
:SOUND &11.1,120,20
290 PROGcomputer
300 IF (L1=0 AND M1=0)
  PROCpieces
310 IF FNtry("0")COLOUR 3
  :PRINT TAB(0,18)"I win"
  :L1=1
  :SOUND &11.2,20,20
320 UNTIL D1=0 OR M1
  OR L1
330 FOR N=0TO 2000
  :NEXT
  :SOUND &11.0,0,0
340 PRINT TAB(5,30)*PRESS
  SPACE FOR A NEW GAME*
350 REPEAT UNTIL 32=GET
360 UNTIL 0
370 DEF PROGpieces
380 RESTORE 1530
390 FOR N1=1TO 9
  :READ X1,Y1
400 IF Z$(N1)="." COLOUR 7
  :COLOUR 128
  :PRINT TAB(X1,Y1);N1
410 IF Z$(N1)="0" COLOUR 131
  :COLOUR 1
  :PRINT TAB(X1,Y1);"0"
  :SOUND &10,-15,6,1
420 IF Z$(N1)="X" COLOUR 128
  :COLOUR 2
  :
  :PRINT TAB(X1,Y1);"X"
  :SOUND &10,-15,5,1
430 NEXT
440 COLOUR 128
450 ENDPROC
460 DEF PROGboard
470 BCOL 0,1
  :VDU 19,3,4;0;
480 FOR X2=446TO 836STEP 128
490 MOVE X2,320
  :DRAW X2,702
500 NEXT
510 FOR Y2=318 TO Y2+386
  STEP 128
520 MOVE 446,Y2
  :DRAW 830,Y2
530 NEXT
540 ENDPROC
550 DEF PROGplayer
560 IF M1 OR L1 ENDPROC
570 REPEAT
580 REPEAT COLOUR 3
  :PRINT TAB(13,30)*SQUARE
  NUMBER  ":
  :VDU 127,127,127

```

```

590 X1=GET -48
600 UNTIL X1>0 AND X1<=9
610 IF Z$(X1)<>".,"VDU 7
620 UNTIL Z$(X1)="."
630 Z$(X1)="X"
640 ENDPROC
650 DEF PROGcomputer
660 IF M1 OR L1 OR D1=0
  ENDPROC
670 READ X,Y
680 IF rnd=TRUE
  THEN PROCrnd
  :ENDPROC
690 RESTORE 1560
700 REPEAT
710 READ X,Y,Z
720 IF Z$(X)="X" AND Z$(Y)="."
  THEN Z$(Z)="."
  THEN T=0
730 UNTIL X=0 OR T=0
740 IF T=0
  THEN Z$(Z)="0"
  :ENDPROC
750 RESTORE
760 REPEAT
770 READ X,Y,Z
780 win=FNtest(X,Y,Z,"0")
790 UNTIL X=0 OR win
800 IF win PROGx
  :ENDPROC
810 RESTORE 1520
820 REPEAT
830 READ X,Z,Y
840 IF Z$(X)="X" AND Z$(Y)="."
  THEN Z$(Z)="."
  THEN T=0
850 UNTIL Z=0 OR X=0
860 IF Z=0 AND Z$(5)="."
  THEN Z$(5)="0"
  :ENDPROC
870 RESTORE
880 REPEAT
890 READ X,Y,Z
900 blk=FNtest(X,Y,Z,"X")
910 UNTIL X=0 OR blk
920 VDU 7
930 IF blk PROGx
  :ENDPROC
940 RESTORE 1540
950 REPEAT
960 READ X,Y
970 IF Z$(X)="X" AND Z$(Y)=".,"

1000 IF Z$(5)="X" P1=-1
  :M1=9
  :
  ELSE P1=0
  :M1=8
1010 REPEAT
  :P1=P1+2
1020 UNTIL Z$(P1)=".," OR P1>M1
1030 IF Z$(P1)=".," THEN Z$(P1)="0"
  :ENDPROC
1040 IF Z$(5)<>"X" P1=0
  :M1=8
  :
  ELSE P1=-1
  :M1=9
1050 REPEAT
  :P1=P1+2
1060 UNTIL Z$(P1)=".," OR P1>M1
1070 IF Z$(P1)=".," THEN Z$(P1)="0"
  :ENDPROC
1080 DEF PROCrnd
1090 DEF PROGx
1100 IF Z$(5)=".," THEN Z$(5)="0"
  :ENDPROC
1110 REPEAT
1120 XZ=RND(9)
1130 UNTIL Z$(XZ)=".," OR Z$(XZ)="0"
1140 Z$(XZ)="0"
  :ENDPROC
1150 ENDPROC
1160 DEF PROGx
1170 IF Z$(X)=".," Z$(X)="0"
  :ENDPROC
1180 IF Z$(Y)=".," Z$(Y)="0"
  :ENDPROC
1190 IF Z$(Z)=".," Z$(Z)="0"
  :ENDPROC
1200 DEF PROGset
1210 FOR N1=1TO 9
  :Z$(N1)=".," :NEXT
  :D1=0
  :M1=0
  :L1=0
1220 ENDPROC
1230 DEF PROGins
1240 COLOUR 1
1250 PRINT TAB(14,0)*TIC-TAC-T
  DE*
1260 COLOUR 2
1270 PRINT ****This is a simple game of Os and Is.****
  "The computer plays with Os and you****play with Is.****To play, enter the number of the square
1280 PRINT **If you try a square that has been taken****the computer will beep.**
1290 PRINT TAB(10,29)*PRESS SPACE TO PLAY*
  :REPEAT UNTIL 32=GET
1300 ENDPROC
1310 DEF PROGinit
1320 DIM Z$(9)
1330 ENVELOPE 1,1,20,-20
  ,20,8,8,8,127,127,0
  ,0,127,127
1340 ENVELOPE 2,1,90,-10
  ,30,3,6,12,127,127,0
  ,0,127,127
1350 ENDPROC
1360 DEF FNtry(1$)
1370 RESTORE 1520
1380 found=FALSE
1390 LOCAL X,Y,Z
1400 FOR N1=1 TO 9
  1410 READ X,Y,Z
  1420 IF FNt(X,Y,Z)
    THEN found=TRUE
  1430 NEXT
  1440 =found
  1450 DEF FNt(x,y,z)
  1460 =(Z$(x)=1$ AND Z$(y)=1$ AND Z$(z)=1$)
  1470 DEF FNtest(X,Y,Z,L$)
  1480 IF (Z$(X)=".," AND Z$(Y)=L$ AND Z$(Z)=L$)
    THEN =TRUE
  1490 IF (Z$(X)=L$ AND Z$(Y)=".," AND Z$(Z)=L$)
    THEN =TRUE
  1500 IF (Z$(X)=L$ AND Z$(Y)=L$ AND Z$(Z)=".,")
    THEN =TRUE
  1510 =FALSE
  1520 DATA 1,2,3,4,5,6,7,8
  ,9,1,4,7,2,5,8,3,6,9
  ,1,5,9,3,5,7,0,0,0
  1530 DATA 15,12,19,12,23
  ,12,15,16,19,16,23,16
  ,15,20,19,20,23,20
  1540 DATA 1,9,9,1,3,7,7,3
  ,0,0
  1550 DATA 1,9,2,8,3,7,4,6
  ,0,0
  1560 DATA 2,4,1,2,3,6,8,6
  ,9,8,4,7,0,0,0

```

This listing is included in this month's cassette tape offer. See order form on Page 47

This maths workout is based on articles that originally appeared in *The Micro User*. Our thanks to our "big brother" magazine for permission to use it.

WE have seen that we can code our numbers in ways other than our usual denary, or decimal, system.

We also looked last month at a way of coding known as the binary system, which uses the digits 0 to 1 to represent any number – unlike the denary system which uses the digits 0 to 9.

To distinguish the two systems, we decided to prefix binary numbers with the symbol "%".

The number "one hundred and sixty two" is encoded in each system as follows:

In denary,

162 i.e. $100+60+2$

In binary,

128 64 32 16 8 4 2 1
% 1 0 1 0 0 0 1 0
i.e. $128+32+2$

Each column in the binary system, known as a "bit", contains either a one or a zero.

Although the binary representation of a number is rather cumbersome to write, this simple two-state system is easily represented by electrical circuits – which are either **on** or **off**.

We saw that the computer handles bits in groups of eight at a time.

Such a group is called a

MIKE BIBBY'S MATHS workout

Exercises for the Electron

byte. Thus a byte contains eight bits labelled, somewhat perversely, bits 0 to 7. (See Figure I.)

Bit 0, as you can see, is the "1" column.

As this is the smallest value bit we say that bit 0 is the least significant bit (LSB). Bit 7, the "128" column, is called the most significant bit (MSB).

The reason for using the numbers 0 to 7 to label the bits instead of the more logical 1 to 8 has to do with powers, a subject you almost certainly covered at school.

"2 to the power 2" is $2 \times 2 = 4$
"2 to the power 3" is $2 \times 2 \times 2 = 8$
"2 to the power 4" is $2 \times 2 \times 2 \times 2 = 16$
and so on. "2 to the power 8" would be eight twos all multiplied together.

Notice as the powers of two increase – that is, as we multiply more twos together – the answers are doubling. Just as our column or bit values do.

Also, 2 to the power of 2 is 4, the value of bit 2, while 2 to

the power of 3 is 8, the value of bit 3.

It shouldn't come as any surprise to you to find that 2 to the power of 7 is 128, the value of bit 7.

You can verify this on the Electron by using the symbol " \wedge " on the "E" key which stands for "to the power of".

Try:

**PRINT 2⁴
PRINT 2⁷**

Be sure to try 2^1 , which will show you why bit 1 has the value 2.

Also try 2^0 . The answer may surprise you.

The fact is that any number to the power 0 is 1! Hence bit zero has the column value of one. Figure II illustrates this.

Look at this sum:

$$\begin{array}{r} \% 1 \\ + \% 1 \\ \hline \% 10 \end{array}$$

If you think about it, that is correct, since the sum adds

one and one, and the answer %10 is binary for two.

One way of relating this to our usual way of doing sums is to say that we carry when we get to two, instead of ten as we do in our normal, decimal, sums.

Another way to look at it is that we have to carry when we get to two because we aren't allowed to use the digit '2'.

If you remember, last month we had a rule forbidding two "coins" of the same value.

Try this sum:

$$\begin{array}{r} 4 \ 2 \ 1 \\ \% \ 1 \ 1 \\ + \% \ 1 \ 0 \\ \hline \% 1 \ 0 \ 1 \end{array} \quad \begin{array}{l} 3 \\ + 2 \\ \hline 5 \end{array}$$

Here we carry from the second column to the third.

Addition is not very hard at all – just make sure that you always "put 0 down and carry 1" when you get a two.

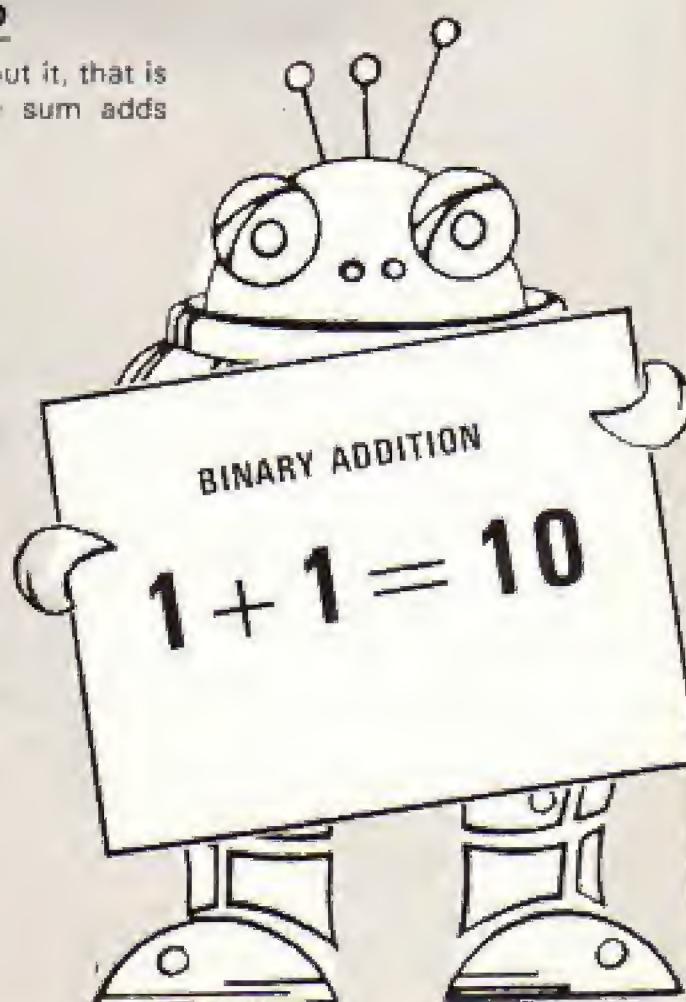
If you get a three then "carry one for two and put one down".

For example:

$$\begin{array}{r} 8 \ 4 \ 2 \ 1 \\ \% \ 1 \ 1 \ 1 \\ + \% \ 1 \ 1 \\ \hline \% 1 \ 0 \ 1 \ 0 \end{array} \quad \begin{array}{l} 7 \\ + 3 \\ \hline 10 \end{array}$$

Subtraction is a little more complicated, and depends on whether you borrow or decompose!

The latter phrase doesn't



Bit number	7	6	5	4	3	2	1	0
	1	0	0	0	1	1	0	1

Bit value	128	64	32	16	8	4	2	1

Figure I: The bit pattern for 141

Bit number	7	6	5	4	3	2	1	0
Bit value	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	128	64	32	16	8	4	2	1

Figure II: The bit pattern for 204

describe the current economic climate, it's just that there are two schools of thought on the way subtraction should be taught – the borrowers and the decomposers.

Fortunately, we can ignore binary subtraction since we can manage without it – as does the microprocessor inside your machine.

If you want to do some binary subtraction it is straightforward enough provided that you remember that it is two you're borrowing or taking, not ten.

Figure III illustrates the process – without any attempt to explain it.

Before we leave the realm of simple sums, look what happens if we shift everything in a binary number over to the left, putting a zero into bit 0, which would be left vacant otherwise. For example:

8 4 2 1
% 1 0 1 which is 5
becomes
8 4 2 1
% 1 0 1 0 which is 10

$\begin{array}{r} \% \quad 0 \quad 1 \quad 1 \quad 0 \\ - \% \quad 1 \quad 1 \\ \hline \% \quad 1 \quad 1 \end{array}$	Decomposition	$\begin{array}{r} \% \quad 1 \quad 1 \quad 0 \\ - \% \quad 1 \quad 1 \\ \hline \% \quad 1 \quad 1 \end{array}$	Borrowing	In decimal 6 -3 3
--	----------------------	--	------------------	---

Figure III: Binary subtraction

This shifting to the left doubles the number automatically.

This isn't too hard to visualise, because the value of each bit is transferred to the next higher bit, which is of course double in value – so the end result is that the whole number is doubled in value.

Similarly, we can do the binary equivalent of DIV 2 by shifting to the right. For example:

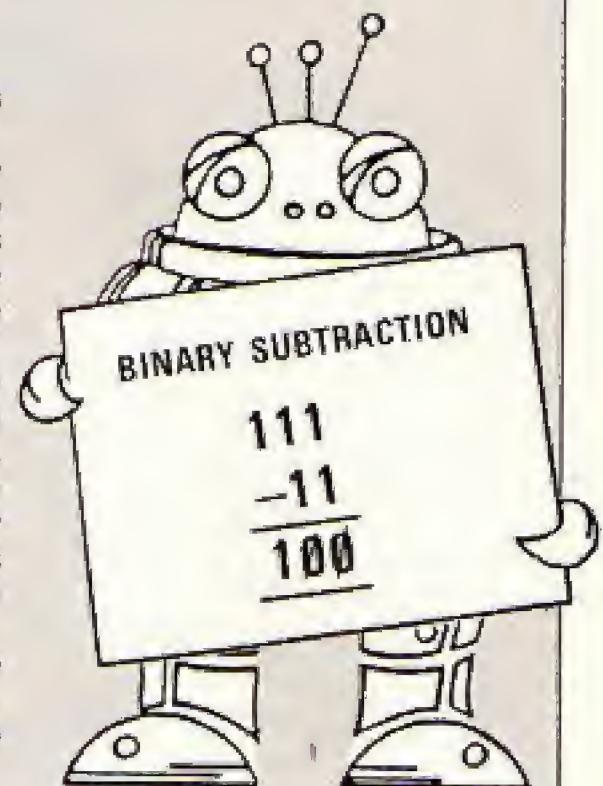
8 4 2 1
% 1 1 0 1 which is 13
becomes
8 4 2 1
% 1 1 0 which is 6

and, of course, 13 DIV 2 gives you 6.

The DIV command, in case you aren't familiar, deals with integer division. That is, it does division but only tells you the "wholes" and ignores the remainders.

As each bit is moved to the right, it occupies a column exactly one half lower in value, thus the sum total of all the bits is one half lower, save for the original bit 0 which has disappeared altogether (hence the ignored remainder).

Well, that's enough binary for one month. Hexadecimal blooms in June!



SIR RESEARCH PRESENTS: OUR RANGE OF PERIPHERALS FOR THE NEW ACORN ELECTRON

SIR ELECTRON 12-ROM BOARD

- ★ Provides for up to 192K of ROM space (16K of this will support either ROM or RAM).
- ★ Fully buffered design.
- ★ Easy to install, just plugs in, no soldering necessary – professional plastic casing.
- ★ Allows further expansion via rear edge-connector.
- ★ Permits use of most BBC ROM/BASED SOFTWARE (such as VIEW, PASCAL, FORTH, etc.).
- ★ Price: £40.00 + VAT.

We also stock a complete range of Printers, Monitors and Software for the BBC Micro at hard to beat prices – most of this is fully Electron-compatible!

SIR ELECTRON PRINTER & JOYSTICKS INTERFACE

- ★ CENTRONICS printer interface.
- ★ Analogue-to-Digital Converter (ADC) allows use of any BBC-compatible joysticks.
- ★ No soldering, plug-in design – professional plastic casing.
- ★ Full firmware support.
- ★ Built-in, versatile edge-connector provides for further expansion.
- ★ Price: £45.00 + VAT.

BBC MICROCOMPUTER
BBC model B £399.00
BBC Model BD £469.00

MONITORS
Sanyo B/G £85.00
Microvitec RGB £229.00

PRINTERS
Dot Matrix:
Epson FX-80 £389.00
Epson RX-80 F/T £289.00
Shinwa CP-80 £263.35
Daisywheel:
Juki 6100 £399.00

DISC DRIVES
Single 100K £179.00
Dual 100K £349.00
Dual 400K £599.00
TORCH Z80 DISC PACK:
(Now with FREE £1.00
worth of software!) £799.00

Please write or telephone for further details. All our prices are inclusive of VAT unless stated otherwise.

Postage and Packaging:

Please add £1 P&P (small items: ROM Boards, etc.);

£10 P&P (large items: Printers, Monitors, etc.).

ACCESS/BARCLAYCARD TELEPHONE ORDERS WELCOME.

SIR COMPUTERS LTD.

91 Whitchurch Road, Cardiff, CF4 3JP.
Telephone: Cardiff (0222) 621813



THE STAR QUESTION

WHILE walking past the Micro User offices (known as the "bunker" to all and sundry), I was shocked to see the Editor actually doing some programming!

Not only that, but it worked!

Anyway, during the three or four hours he was out at lunch I nipped into

his office, cleared away the empties and put a tape in the cassette and SAVED it.

Obviously anything that BBC Micro owners have is fair game for us morally superior Electron users, so here it is. Can you figure out how he did it? I don't mean how it works, but how HE did it!

```

10 REM SHELL
20 REM BY MIKE BIBBY
30 REM (C) ELECTRON USER
40 REM WITH THANKS TO
50 REM THE MICRO USER
60 MODE 0
:VDU 27,500:500:
70 FACTOR=0.25
:SET=0.75
80 FOR FSET=0 TO 2.5
STEP 0.5
90 FOR CIRCLE=0 TO 2*
PI +0.2 STEP 0.2
100 XPOS=(COS (FSET)*
COS (CIRCLE)-SIN (FSET)*
SIN (CIRCLE)*FACTOR)*500
110 YPOS=(COS (CIRCLE)*
SIN (FSET)+SIN (CIRCLE)*
COS (FSET)*FACTOR)*500
120 IF CIRCLE=0
THEN MOVE XPOS,YPOS
130 DRAW XPOS,YPOS
140 NEXT
:NEXT

```

ELECTRON EDUCATIONAL SOFTWARE

Our educational software is used in thousands of schools and homes throughout Great Britain.

EDUCATIONAL 1 £6.00

Hours of fun and learning for children aged 5 to 9 years. Animated graphics will encourage children to enjoy maths, counting, spelling and telling the time. The tape includes MATH1, MATH2, CUBECOUNT, SHAPES, SPELL and CLOCK.

... 'An excellent mixture of games' ... Personal Software - Autumn 1983.

EDUCATIONAL 2 £6.00

Although similar to Educational 1 this tape is more advanced and aimed at 7 to 12 year olds. The tape includes MATH1, MATH2, AREA, MEMORY, CUBECOUNT and SPELL.

FUN WITH NUMBERS £8.00

This program will teach and test basic counting, addition and subtraction to 4 to 7 year olds. The tape includes COUNTING, ADDING and an arcade type game to exercise addition and subtraction. With sound and visual effects.

FUN WITH WORDS £8.00

Start your fun with alphabet puzzle, continue your play with VOWELS, learn the difference between THERE and THEIR, have games with SUFFIXES and reward yourself with a game of HANGMAN. Complete with sound and graphics. The tape includes ALPHA, VOWELS, THERE, SUFFIXES and HANGMAN.

... 'Very good indeed' ... A&B Computing - Jan/Feb 1984.

JIGSAW AND SLIDING PUZZLES £7.95

There are 2 jigsaws and 4 sliding puzzles on a 3 x 3 and 4 x 4 grid. Each program starts off at an easy level to ensure initial success but gradually becomes harder. It helps children to develop spacial imagination and in problem solving. The tape includes 6 programs: OBLONG, JIGSAW, HOUSE, NUMBERS, CLOWN and LETTERS.

*** SPECIAL OFFER ***

Buy three cassettes and deduct £4.00

Add 50p per order p&p. Cheque to:

GOLEM LTD,

Dept E, 77 Qualitas, Bracknell, Berks RG12 4QG.
Tel. (0344) 50720

BBC/ELECTRON ADVENTURES

NEW WOODLAND TERROR £7.48 (CASS) £10.50 (DISC)

The sequel to FIRIENWOOD, many years ago an intrepid adventurer embarked on a quest for the Golden Bird of Paradise. Although successful, our hero released a sinister force which now lurks within the enchanted wood. Your mission is to return the terror to its original resting place and restore peace to an unhappy land!! This is a complete game, knowledge of Firienwood is not required.

FIRIENWOOD £7.48 (CASS) £10.50 (DISC)

An evil wizard has captured the magic golden bird of paradise and imprisoned it in a weird castle in the middle of the enchanted Firienwood. Your quest is to find the bird and set it free, in return the bird will give you health and prosperity. BEWARE! many perils lie before you and every move is fraught with danger!!

BLUE DRAGON £7.48 (CASS) £10.50 (DISC)

Somewhere in a strange and dangerous land lies a fabulous treasure guarded by a fierce dragon. Can you survive the perils that await and recover the treasure or will you meet a nasty end!! What is making terrible slurping noises deep underground and what use is the strange black cloud? Play the game and find out.

SURVIVOR £7.48 (CASS) £10.50 (DISC)

The year is 1910 you are sailing on a steamer bound for Borneo when there is an explosion and the ship sinks. Shipwrecked on a tropical island can you survive and escape back to ... or will you end up in someone's cooking pot!! There is more than one ending to this game, not all of them bad!

All the games are in machine code for fast responses and are text only. Please state which machine when ordering. Prices include VAT and postage within U.K. Cheques payable to MP SOFTWARE or write/phone with your ACCESS/VISA card No. Send S.A.E. for full range of programs and price list or ask your local dealer. Trade enquiries welcome.

We pay well for good original programs contact us today for more details.

MP

SOFTWARE & SERVICES

165, SPITAL ROAD, BROMBOROUGH, MERSEYSIDE L62 2AE. 051-334 3472

Quick Draw listing

From Page 29

```

10 REM ELECTRON DRAUGHTSMAN
20 REM By Mike Cook
30 REM (C) ELECTRON USER
40 *KEY0 MODE 6:1M *FX4
    .01M *FX12,01M
50 REM PRESS FUNCTION KEY0
    TO REGAIN EDITING
60 ZX=1
    :CX=3
70 MODE ZX
80 TRIANGLE=FALSE
90 DAFT=FALSE
100 *FX11,0
110 *FX4,1
120 PRX=FALSE
130 DIM CLIX 40
140 CLS
150 PROC_INSTRUCTIONS
160 VDU 28,0,0,39,0
170 VDU 19,2,2,0,0,0
180 GCOL 3,CX
190 REPEAT
200 ZX=50
    :YZ=50
210 REPEAT
220 A$=INKEY$ (0)
230 IF ASC (A$) > 134
    THEN A$=" "
240 UNTIL A$<>" "
250 FIRSTZ=TRUE
260 IF A$="W"
    THEN CLG
270 IF A$="S"
    THEN PROC_FILE
280 IF A$="G"
    THEN PROC_GET
290 IF A$="P"
    THEN PROC_POLY
300 IF A$="R"
    THEN PROC_REC
310 IF A$="C"
    THEN PROC_COLCHANGE
320 IF A$="L"
    THEN PRINT "LINE";
    :PROC_LINE
330 IF A$="T"
    THEN PROC_TRIANGLE
340 IF A$<>"C"
    THEN PRINT
350 UNTIL DAFT
360 DEF PROC_FILE
370 PRINT
380 INPUT "FILE NAME FOR
    SAVED SCREEN",FS
390 IF LEN (FS) < 1
    THEN ENDPROC
400 $CLIZ="SAVE "+FS+" 3000
    :0000

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter is given on Page 4 of the February issue.

```

410 XX= CLIX MOD 256
  :YX=CLIX DIV 256
420 CALL &FFFF7
430 ENDPROC
440 DEF PROC_GET
445 #D.
450 PRINT
460 INPUT "FILE NAME OF SCREE
  N",FS
470 IF LEN (FS) < 1
  THEN ENDPROC
480 $CLIZ="LOAD "+FS
490 XI= CLIX MOD 256
  :YX=CLIX DIV 256
500 CALL &FFFF7
510 ENDPROC
520 DEF PROC_COLCHANGE
530 C2=(CI+1) AND 3
540 IF CX=0
  THEN CX=CX+1
550 COLOUR CX
  :GCOL 3,CZ
560 PRINT "NEW COLOUR ";
570 ENDPROC
580 DEF PROC_BAND1
590 REPEAT
600 PROC_FOLLOW
610 A$=INKEY$ (0)
620 IF ASC (A$) > 134
  THEN A$=""
630 UNTIL A$(> ""
640 OXX=XX
  :OYX=YX
650 XTX=XX
  :YTX=YX
660 ENDPROC
670 DEF PROC_BAND2
680 REPEAT
690 PROC_FOLLOW
700 MOVE OXX,OYX
710 PLOT 13,XTX,YTX
720 MOVE OXX,OYX
730 PLOT 13,XX,YX
740 XTX=XX
  :YTX=YX
750 A$=INKEY$ (0)
760 IF ASC (A$) > 134
  THEN A$=""
770 UNTIL A$(> ""
780 MOVE OXX,OYX
790 PLOT 13,XX,YX
800 ENDPROC
810 DEF PROC_LINE
820 REPEAT
830 IF A$(> "J"
  THEN PROC_BAND1
  :T1XX=OXX
  :T1YX=OYX
  900 OXX=XX
  :OYX=YX
  910 UNTIL A$=CHR$ (13)
  OR TRIANGLE=TRUE
920 ENDPROC
930 DEF PROC_TRIANGLE
940 PRINT "TRIANGLE";
950 REPEAT
960 TRIANGLE=TRUE
970 PROC_LINE
980 TRIANGLE=FALSE
990 REPEAT
1000 T2XX=XX
  :T2YX=YX
1010 PROC_TRIBAND(XX,YX)
1020 REPEAT
1030 PROC_FOLLOW
1040 PROC_TRIBAND(OXX,OYX)
1050 OXX=XX
  :OYX=YX
1060 PROC_TRIBAND(XX,YX)
1070 A$=INKEY$ (0)
1080 IF ASC (A$) > 134
  THEN A$=""
1090 UNTIL A$(> ""
1100 PROC_TRIBAND(XX,YX)
1110 GCOL 0,CZ
1120 PROC_TRIBAND(XX,YX)
1130 GCOL 3,CZ
1140 IF A$(>CHR$ (13)
  THEN PLOT 69,XX,YX
1150 T1XX=T2XX
  :T1YX=T2YX
1160 UNTIL A$(> "J"
1170 UNTIL A$=CHR$ (13)
1180 ENDPROC
1190 DEF PROC_TRIBAND(XX
  ,YX)
1200 MOVE T1XX,T1YX
1210 PLOT 13,XX,YX
1220 MOVE T2XX,T2YX
1230 PLOT 13,XX,YX
1240 ENDPROC
1250 DEF PROC_REC
1260 PRINT "RECTANGLE";
1270 REPEAT
1280 PROC_BAND1
1340 OXX=XX
  :OYX=YX
1350 PROC_REC
1360 A$=INKEY$ (0)
1370 IF ASC (A$) > 134
  THEN A$=""
1380 UNTIL A$(> ""
1390 PROC_REC
1400 GCOL 0,CX
1410 PROC_REC
1420 GCOL 3,CX
1430 IF A$(> CHR$ (13)
  THEN PLOT 69,XX,YX
1440 ITX=XI
  :YTX=YX
1450 UNTIL A$(> "J"
1460 UNTIL A$=CHR$ (13)
1470 ENDPROC
1480 DEF PROC_REC
1490 MOVE XTX,YTX
1500 PLOT 13,XTX,OYX
1510 PLOT 13,OXX,OYX
1520 PLOT 13,OXX,YTX
1530 PLOT 13,XTX,YTX
1540 ENDPROC
1550 DEF PROC_POLY
1555 REPEAT
1560 INPUT "POLYGON NUMBER
  OF SIDES",NZ
1565 UNTIL NZ>0
1570 PRINT NZ;" SIDED POLYGON";
1580 REPEAT
1590 PROC_BAND1
1600 REPEAT
1610 PROC_BAND2
1620 PROC_DPOLY(XX,YX,OXX
  ,OYX,NZ)
1630 IF A$="J"
  THEN MOVE OXX,OYX
  :PLOT 13,XX,YX
1640 UNTIL A$(> "J"
1650 UNTIL A$=CHR$ (13)
1660 PLOT 69,XX,YX
1670 ENDPROC
1680 DEF PROC_DPOLY(X,Y,XTX
  ,YTZ,NZ)
1690 LOCAL CI,SI,P,R,AZ,XX
  ,YX
1700 GCOL 0,CX
1710 P=2*PI /NZ
1720 NZ=NZ+1
1730 CI=COS (P)
1740 SI=SIN (P)

```

Quick Draw listing

From Page 57

```

1750 MOVE X,Y
1760 FOR AX=1 TO NX-1
1770 X1=XTZ+(X-XTZ)*C1-(Y-YTZ)
  *S1
1780 Y1=YTZ+(X-XTZ)*S1+(Y-YTZ)
1790 X=X1
  :Y=Y1
1800 DRAW X,Y
1810 NEXT
1820 BCOL 3,CX
1830 PLOT 69,XX,YZ
1840 ENDPROC
1850 DEF PROC_FOLLOW
1860 IF FIRSTZ
  THEN FIRSTZ=FALSE
  ELSE PLOT 69,XX,YZ
1870 DEF PROC_CURS
1880 IF INKEY (-122)
  THEN XZ=XZ+SPEEDZ
  :PRZ=TRUE
1890 IF INKEY (-26)
  THEN XZ=XZ-SPEEDZ
  :PRZ=TRUE
1900 IF INKEY (-58)
  THEN YZ=YZ+SPEEDZ
  :PRZ=TRUE
1910 IF INKEY (-42)
  THEN YZ=YZ-SPEEDZ
  :PRZ=TRUE
1920 IF XX>1279 OR XX<0
  OR YZ>1023 OR YZ<0
  THEN PRINT
    :PRINT "X = ";XX;" Y
    = ";YZ;
1930 IF PRZ
  THEN SPEEDZ=SPEEDZ+2
  ELSE SPEEDZ=1
1940 IF SPEEDZ>30
  THEN SPEEDZ=30
1950 IF NOT (PRZ)
  THEN 1970
1960 #FI15.1
1970 PRZ=FALSE
1980 PLOT 69,XX,YZ
1990 ENDPROC
2000 DEF PROC_INSTRUCTIONS
2010 PRINT
2020 PRINT SPC (9); "ELECTRON

```

```

DRAUGHTSMAN"
2030 PRINT SPC (13); "By Mike
  Cook"
2040 PRINT
2050 PRINT "First select a
  mode by typing a letter:
  -"
2060 PRINT
2070 PRINT "L - Draw a LINE"
2080 PRINT "T - Draw a TRIANGL
  E"
2090 PRINT "R - Draw a RECTANG
  LE"
2100 PRINT "P - Draw a POLYGON
  or CIRCLE"
2110 PRINT
2120 PRINT "Then move the
  dot with the cursor keys."
2130 PRINT
2140 PRINT "Press RETURN at
  the end of each stage"
2150 PRINT "or to stay in
  the mode press SPACE."
2160 PRINT "Alternatively
  pressing J as the last
  key";

```

```

2170 PRINT "will Join up the
  next shape."
2180 PRINT
2190 PRINT
2200 PRINT "Other commands
  are:-"
2210 PRINT
2220 PRINT "C - To change
  the COLOUR"
2230 PRINT "W - To Wipe the
  screen clean"
2240 PRINT "S - To SAVE the
  screen as a file"
2250 PRINT "G - To GET a scree
  n previously saved"
2260 PRINT
2270 PRINT "Press any key
  to begin."
2280 AT=GET$
2290 CLS
2300 ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 47

Maths Hike listing

From Page 37

```

  THEN PRINT TAB(20
  ,7)
370 UNTIL limit>1
380 INPUT TAB(3,10) "What
  level of difficulty?(1
  -9)"TAB(20,12) difficul
  ty
390 IF difficulty < 1
  OR difficulty >9
  THEN PRINT TAB(20
  ,12)
  :GOTO 380
400 INPUT TAB(3,15)"How
  many calculations
  do you want?"TAB(20
  ,17)turns
410 FOR delay= 1 TO 1000/di
  fficulty
  :NEXT delay
420 CLS
430 ENDPROC
440 DEF PROChike
450 total=RND(limit%)
460 PRINT TAB(12,15) total

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are given on Page 4 of the February issue.

```

470 SOUND &11,-15,100
  ,2
480 sum$=STR$ (total)
490 FOR delay= 1 TO 2000/di
  fficulty
  :NEXT delay
500 FOR goes=1 TO turns
510 CLS
520 sum$=STR$ (total)
530 chance=RND(4)
540 IF chance=1
  THEN operator$="*"
550 IF chance=2
  THEN operator$="^"
560 IF chance=3
  THEN operator$="*"
570 IF chance=4

```

```

  THEN operator$="/"
580 number$=STR$ (RND(limit
  %))
590 total=EVAL (sum$+operat
  or$+number$)
600 PRINT TAB(20,15) operat
  or$+number$
610 SOUND &11,-15,100
  ,2
620 FOR delay= 1 TO 2000/di
  fficulty
  :NEXT delay
630 sum$=STR$ (total)
640 NEXT
650 ENDPROC
660 DEF PROCdanswer
670 CLS
680 INPUT TAB(5,10) "What's
  the answer?"TAB(19

```

,13) answer
690 IF answer=EVAL (sum\$)

```

  THEN PRINT TAB(5,17)
  "Correct."
  :ENVELOPE 2,2,6,0
  ,0,255,0,0,126,0,0
  ,-126,126,126
  :SOUND 1,2,4,50
700 IF answer<>EVAL (sum$)
  THEN PRINT TAB(5,15)
  "Wrong. The answer
  was ";EVAL (sum$)
  :SOUND 0,-15,2,10
710 PRINT TAB(5,22) "Press
  any key for another
  go"
720 PRINT TAB(5,24) "Press
  ESCAPE to change
  levels"
730 ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 47

From Page 27

```

        THEN PROCend("TWO")
680 X1Z=X1Z+X3Z
690 Y1Z=Y1Z+Y3Z
700 ENDPROC
710 :
720 :
730 DEF PROChelp
740 Y1Z=Y1Z-Y3Z
750 X1Z=X1Z-X3Z
760 X3Z=0
770 Y3Z=0
780 IF POINT(X1Z+32+16
, Y1Z+32+16)=0
    THEN C1Z=225
    :X3Z=0
    :Y3Z=1
790 IF POINT(X1Z+32+48
, Y1Z+32-16)=0
    THEN C1Z=227
    :X3Z=1
    :Y3Z=0
800 IF POINT(X1Z+32+16
, Y1Z+32-48)=0
    THEN C1Z=226
    :X3Z=0
    :Y3Z=-1
810 IF POINT(X1Z+32-16
, Y1Z+32-16)=0
    THEN C1Z=228
    :X3Z=-1
    :Y3Z=0
820 ENDPROC
830 :
840 :
850 DEF PROCc2
860 PROCc2
870 IF X4Z=0 AND Y4Z=0
    THEN PROCend("ONE")
880 X2Z=X2Z+X4Z
890 Y2Z=Y2Z+Y4Z
900 ENDPROC
910 :
920 :
930 DEF PROChe2
940 X2Z=X2Z-X4Z
950 Y2Z=Y2Z-Y4Z
960 X4Z=0
970 Y4Z=0
980 IF POINT(X2Z+32+16
, Y2Z+32+16)=0
    THEN C2Z=225
    :X4Z=0
    :Y4Z=1
990 IF POINT(X2Z+32+48
, Y2Z+32-16)=0
    THEN C2Z=227
    :X4Z=1
    :Y4Z=0

```

```

1000 IF POINT(X2%*32+16
  .Y2%*32+48)=0
  THEN C2%:=225
  :X4%:=0
  :Y4%:=-1
1010 IF POINT(X2%*32+16
  .Y2%*32+16)=0
  THEN C2%:=228
  :X4%:=-1
  :Y4%:=0
1020 ENDPROC
1030 :
1040 :
1050 DEF PROCend(W$)
1060 IF W$="ONE"
  THEN X1%:=X1%+Y3%
  :Y1%:=Y1%+Y3%
  :PROChelo
1070 IF W$="ONE" AND X3%<0
  AND Y3%<0
  THEN W$="DRAW"
1080 IF W$="TWO"
  THEN X2%:=X2%+X4%
  :Y2%:=Y2%+Y4%
  :PROChelo
1090 IF W$="TWO" AND X4%<0
  AND Y4%<0
  THEN W$="DRAW"
1100 FOR W=1TO 2500
1110 NEXT
1120 VDU 4
1130 IF W$="DRAW"
  THEN PRINT TAB(10
  ,10); "A draw"
  :GOTO 1180
1140 PRINT TAB(10,10); "Playe
r ";W$; " won."
1150 PROCs("bBBABcCbBaAAGAbB
gBbBBABcDeEdDcAgBg"
  .2)
1160 IF W$="ONE"
  THEN G%:=G%+1
1170 IF W$="TWO"
  THEN H%:=H%+1
1180 FOR W=1TO 2500
1190 NEXT
1200 *FX15.0
1210 PROCscores
1220 PROCfinish
1230 ENDPROC
1240 :
1250 :
1260 DEF PROCintro
1270 PRINT TAB(12,1); "*****+
  +*****+"
1280 PRINT TAB(12,5); "***+
  CHASER ***"
1290 PRINT TAB(12,6); "*****+
  +*****+"
1300 PRINT TAB(3,10); "Design
  ed and written by :"
1310 PRINT TAB(9,13); "*****+
  +*****+*****+"
1320 PRINT TAB(9,14); "***+
  James Mcpherson ***"
1330 PRINT TAB(9,15); "***+
  ***"
1340 PRINT TAB(9,16); "**
  & Peter Mitchell.
  **"
1350 PRINT TAB(9,17); "*****+
  +*****+*****+"
1360 PRINT TAB(14,22); "PRESS
  ANY KEY"
1370 A$=GET
1380 CLS
1390 PRINT TAB(13,3); "**
  CHASER **"
1400 PRINT TAB(3); "This
  is a game for two
  players."
1410 PRINT TAB(3); "Player
  one starts with the
  arrow on"
1420 PRINT TAB(3); "the
  left while player
  two starts"
1430 PRINT TAB(3); "with
  the arrow on the right
  ."
1440 PRINT TAB(3); "During
  the game if either
  of the"
1450 PRINT TAB(3); "players
  tries to cross a path
  left"
1460 PRINT TAB(3); "their
  opponent or themselves
  ;t"
1470 PRINT TAB(3); "cannot
  be done."
1475 PRINT TAB(3); "The
  loser is the first
  one to run"
1476 PRINT TAB(3); "out
  of room."
1480 PRINT TAB(10); "PRESS
  ANY KEY"
1490 A$=GET
1500 CLS
1510 PRINT TAB(12,5); "**
  CONTROLS **"
1520 PRINT TAB(10); "Player
  1 :";TAB(21); "Player
  2 :"
1530 PRINT "left"
1540 PRINT "right"
1550 PRINT "up"
1560 PRINT "down"
1570 PRINT TAB(11,11); "
  1 ";TAB(24,11); "
  "
  1580 PRINT TAB(11,12); "
  "
  1 ";TAB(24,12); "
  "
  1590 PRINT TAB(11,13); "
  "
  0 ";TAB(24,13); "
  "
  1600 PRINT TAB(11,14); "
  "
  A ";TAB(24,14); "
  "
  1610 PRINT TAB(8,20); "Press
  any key to begin."
1620 A$=GET
1630 PROCs("CCDEFEDGCCDEFCCB
  CCDEFEDCCBGBABCCC".4)
1640 ENDPROC
1650 :
1660 :
1670 DEF PROCfinish
1680 FOR W=1 TO 500
1690 A$=INKEY (0)
1700 NEXT
1710 A$=GET
1720 CLS
1730 CLEAR
  :GOTO 90
1740 END
1750 ENDPROC
1760 :
1770 :
1780 DEF PROCscores
1790 VDU 4
1800 VDU 19,0,6,0;0
1810 CLS
1820 COLOUR 130
  :COLOUR 1
1830 PRINT TAB(16,2); "CHASER
  "
1840 PRINT TAB(8,7); "*****+
  +*****+*****+"
1850 PRINT TAB(8,8); "Player
  1.....";G%
  " "
1860 PRINT TAB(8,9); "*****+
  +*****+*****+"
1870 PRINT TAB(8,11); "*****+
  +*****+*****+"
1880 PRINT TAB(8,12); "*
  Player 2.....";H%
  " "
1890 PRINT TAB(8,13); "*****+
  +*****+*****+"
1900 PRINT TAB(7,23); "Press
  any key to continue"
1910 ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on Page 47.

Coder listing

From Page 22

```

160 DEF PROCINIT
170 READ PASSWORD$
180 DIM PLACE(6)
190 ENDPROC
200 DEF PROCIDENTIFY
210 ATTEMPTS=0
220 PRINT ** ELECTRON EDDIES
    SECRET CODING MACHINE**
    ****
    ****
230 VDU 7
:PRINT **"Type in the
password"
240 PRINT TAB((40-LEN (PASSWORD$)
    RD$))/2,10)STRING$(1
    LEN (PASSWORD$),"-")
250 PRINT TAB((40-LEN (PASSWORD$)
    RD$))/2,10);
260 IDENTITY$=**
    :FX15,1
270 FOR IX=1TO LEN (PASSWORD$)
280 IDENTITY$=IDENTITY$+GET$
290 PRINT SPC (1);
300 NEXT
310 IF PASSWORD$=IDENTITY$
    ENDPROC
320 ATTEMPTS=ATTEMPTS+1
330 IF ATTEMPTS<3
    THEN VDU 7
    :CLS
    :PRINT "WRONG PASSWORD!..
    ....TYPE IT AGAIN!"
    :GOTO 240
340 VDU 7
    :CLS
350 PRINT ****"ILLEGAL OPERAT
ION...****SORRY, YOU
CAN'T USE THE PROGRAM"
    :GOTO 350
360 DEF PROCNUMBER
370 VDU 7
    :CLS
    :INPUT **"Enter your
    code number and press
    RETURN"**  "N$"
380 IF LEN (N$)<>6 PROCINVALI
D
    :GOTO 370
390 FOR IX=1TO 5
    :IF INSTR(N$,STR$ (IX))=0
        IX=6
    :PROCINVALID
    :GOTO 370
400 NEXT
410 IF VAL (RIGHT$ (N$,1))<0
    OR VAL (RIGHT$ (N$,1))>

```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are given on Page 4 of the February issue.

```

    PROCINVALID
    :GOTO 370
420 ENDPROC
430 DEF PROCINVALID
440 VDU 7
    :CLS
    :PRINT **"YOUR CODE NUMBE
R WAS INVALID!"
450 PRINT **"It must consist
    of six numbers!**"
    "The first five must
    be the numbers from
    1 to 5 rearranged in
    some order."
460 PRINT **"The last must
    be a number from 0 to
    4"
470 PRINT **"Here are some
    examples that will work:
    -**"142354    245312
    123540    254313"
480 PRINT **"See Electron
    User for more details."
490 PRINT **"Press any key, th
    en enter your code again"
    :A=GET
    :ENDPROC
500 DEF PROCTYPEIN
510 VDU 7
    :CLS
    :PRINT **"Type in your
    message"**"The maximum
    length is 250 characters
    **"The present length
    is"**"Press RETURN to
    end the message"
520 PART$=**
    :MESSAGE$=**
530 REPEAT
540 PRINT TAB(LEN (MESSAGE$)
    MOD 40,10+LEN (MESSAGE$)
    DIV 40)PART$**
550 IF ASC (PART$)=127
    THEN MESSAGE$=LEFT$ (MESSA
    GE$,LEN (MESSAGE$)-1)
    ELSE MESSAGE$=MESSAGE$+PA
    RT$**
560 PRINT TAB(22,6)STR$ (
    LEN (MESSAGE$))
570 PART$=GET$
580 IF LEN (MESSAGE$)>=240
    PRINT TAB(0,20)**MESSAGE
    NEARLY MAXIMUM LENGTH"
    :VDU 7
590 FOR IX=1TO 6
600 PLACE(IX)=VAL (MIDS (N$,
    ,1,1))
610 NEXT
620 UNTIL PART$=CHR$ (13)
    OR LEN (MESSAGE$)=250
630 ENDPROC
640 DEF PROCCODE
650 PROCTYPEIN
660 VDU 7
    :CLS
    :PRINT TAB(5,10)**MESSAGE
    IS BEING CODED"
670 CI=0
    :CODE$=**
680 REPEAT
690 FOR IX=1TO 5
700 CODE$=CODE$+MIDS (MESSAGE$,
    ,CI+PLACE(IX),1)
710 NEXT
720 CI=CI+5
730 UNTIL CI>LEN (MESSAGE$)
740 FINALCODE$=**
750 FOR IX=1TO LEN (MESSAGE$)
760 FINALCODE$=FINALCODE$+
    CHR$ (ASC (MIDS (CODE$,
    ,IX,1))+PLACE(6))
770 NEXT
780 CLS
    :VDU 7
    :PRINT "Your message:-" N
    MESSAGE$**"Has been coded
    to:-" FINALCODE$**"Do
    you want to save it
    on tape (Y OR N)?"
790 ANSWER$=GET$
    :IF ANSWER$="N"
        THEN 840
    ELSE IF ANSWER$>"Y"
        THEN 790
800 *OPT1,1
810 XI=OPENOUT ("CODE")
820 PRINT XI.FINALCODE$**
830 CLOSE XI
840 ENDPROC
850 DEF PROCDECODE
860 VDU 7
    :CLS
    :PRINT **"Do you wish
    to enter the coded messa
    ge****from the keyboard,
    or tape (K or T)?"
870 ANSWER$=GET$
    :IF ANSWER$="K"PROCTYPEIN
    :GOTO 920
    ELSE IF ANSWER$<>"T"
        THEN 870
880 *OPT1,1
890 XI=OPENIN ("CODE")
900 INPUT #XI.MESSAGE$
910 CLOSE XI
920 FINALCODE$=MESSAGE$
930 FOR IX=1TO 5
940 PLACE(IX)=INSTR (N$,
    STR$ (IX))
950 NEXT
960 PLACE (6)=VAL (RIGHT$ (N$,
    ,1))
970 VDU 7
    :CLS
    :PRINT TAB(5,10)**MESSAGE
    IS BEING DECODED"
980 CODE$=**
990 FOR IX=1TO LEN (FINALCODE
    $)
1000 CODE$=CODE$+CHR$ (
    ASC (MIDS (FINALCODE$,
    ,IX,1))-PLACE (6))
1010 NEXT
1020 CI=0
    :MESSAGE$=**
1030 REPEAT
1040 FOR IX=1TO 5
1050 MESSAGE$=MESSAGE$+
    MID$ (CODE$,CI+PLACE (IX),
    ,1)
1060 NEXT
1070 CI=CI+5
1080 UNTIL CI>LEN (CODE$)
1090 CLS
    :VDU 7
    :PRINT **"Your coded messa
    ge:-" FINALCODE$**"Decode
    s to:-" MESSAGE$**
1100 ENDPROC
1110 DATA ELECTRON

```

This listing is included in this month's cassette tape offer. See order form on Page 47

Micro Messages

IN REPLY to Mr Bobut's letter in the March 1984 Electron User lamenting the lack of a *TV255 on the Electron. I suggest that he tries:

VDU 26,0,24,39,1
which, in Mode 6, will get rid of the top line of text and so make his listings more readable.

This puts the text in a window which is the same as the screen except for the top line.

*KEY0*VDU28,0,24,
39,1,M

puts this utility on the 0 function key. — K. Goodacre, Sheffield.

● Many thanks for this software solution.

Hardware alternative

REGARDING the lack of Electron *TV commands, Acorn recommend reducing the height of the picture on the TV.

On newer TVs this adjustment has to be carried out inside the set, but on older sets you might have to take it to a TV shop. — I. Gardner, Sandwich, Kent.

● Thanks for giving us the hardware alternative to the problem.

Simple saving remedy

DO any readers have problems saving and loading programs?

If, like me, you get the dreaded 'Data?, Block?, Rewind tape' messages, I think there may be a simple remedy.

As recommended I connected my Electron to the Mic input on my tape recorder. Due to its sensitivity this distorted the recorded signal, so the computer couldn't

Software solution to *TV255 poser

always read it properly when loading.

So I tried connecting it instead to the tape recorder's other input socket, usually marked Aux. or Line Input.

This worked superbly, and I now save and load programs with ease.

An alternative would be to put a resistor in series with the recorder's Mic input to cut down the signal strength. Something between 1 to 5k ohm should work.

Resistors are only 4p each, and much cheaper than a new recorder.

Also a $\frac{1}{2}$ watt resistor should fit neatly inside a solder tag jack plug. — L.J. Goodridge, Leeds.

● Many thanks for your tip. Has anyone else any helpful advice about cassette difficulties that they'd like to share?

Adding more colour

I'D like to make a comment about the DRAW program in Notebook (March 1984 Electron User).

During each pass through the nested loop lines 50, 60 and 70 determine the three colours from which line 140 chooses.

This restricts the number of colours to three and, because of the random nature of lines 50, 60 and 70, some of these colours can be the same.

This can be avoided

by putting in the following lines:

```
50 VDU 19,1,  
RND(3),0,0,0  
60 VDU 19,2,  
RND(2)+3,0,0,0  
70 VDU 19,3,  
RND(2)+5,0,0,0
```

This avoids the duplication of colours. — A. Farmer, Warrington.

● Many thanks for your new lines. We like to hear of improvements to our listings.

Cash-in with the Count

IN the January 1984 Electron User there is an article called "Going Quackers" in which two head shapes are shown, VDU 227 and VDU 228.

On running the program I saw that VDU 228 wasn't used, so I made my first attempt at programming.

I inserted three extra lines as follows:

```
361 VDU 17,2,228,  
10,8,17,0,  
231,233,10,8,  
234,234,8,8,  
8,232,232  
362 PROCdelay  
363 VDU 9,127,  
127,127,11,  
9,9,9,127,  
127,127,11,  
.9,9,127,  
127,127,127
```

Now the duck stops and turns its head. I thought you might be interested. — Graeme J.

all your receipts and payments, key in 0, press Return and you have your balance in hand. — W.J. Davies, Sidcup, Kent.

● Many thanks for the program Mr Davies. It was a nice idea to send us the listing on some double-entry paper!

Use GOTOS properly

I HAVE been reading with some amusement the many arguments about structured programming. Somebody should explain to everyone what it really is!

A structured program can have as many GOTOS and GOSUBs as you want — as long as they are used properly.

I used to have a Jupiter Ace and spent a year programming in Forth. I can only write structured programs. — R.A. Waddilove, Widnes.

● This is an argument that seems to have spilled over from the pages of *The Micro User*.

Some people love structured, others hate it. Still others try to be structured but slip into the occasional GOTO.

What do our readers think? Do you care? And what micros (if any) did you have before your Electron and how did they compare?

Is this a record?

I SCORED 106,300 recently on the Micro Power game *Killer Gorilla*.

I was wondering if this was the highest

Cole, Leyton, London.

● Nice one Graeme. If that's your first attempt at programming we're looking forward to the others. Incidentally, has anyone got a better quacking sound?

Stopping the duck!

THE Count program in the February 1984 issue of Electron User can become a very neat cash account with one or two modifications. The altered listing is as follows:

```
10 REM CASH  
ACCOUNT  
20 REM BY  
W.J.DAVIES  
30 PRINTTAB(16);  
"CASH ACCOUNT"  
40 PRINTTAB(16);  
"-----"  
50 PRINT  
60 total=0  
70 REPEAT  
80 PRINT  
90 INPUT"Amount?"  
TAB(16)  
" " "number  
100 total=  
total+number  
110 UNTIL  
number=0  
120 PRINT  
130 PRINTTAB(7);  
"Balance";  
" " "total
```

Just run the program and type in the amounts required. For cash paid out use the minus sign before the figures.

After you've entered

Micro Messages

From Page 61

score so far, after reading that the hi-score was 68,300. — **David Moffat, Methil, Fife.**

Well done David, it's nice to hear of someone so skilled. No one at *Electron User* will admit their scores, and we've certainly not come across any higher one. No doubt we shall hear.

Flowers after just 7 weeks

I AM sending you this short program, hoping it will be of some interest.

It produces flowers of red, yellow and cyan on a green background, clearing when 300 have "grown".

I'm sure you will not find it perfect, as it's my first effort — we have only been *Electron* owners for seven weeks.

If nothing else, the character definitions for the flower (see lines 80-110) may be of some use. — **Mrs June Griffin, Royston, Herts.**

```
10 REM FLOWERS
20 REM BY
  J.K.GRIFFIN

30 MODE 1
40 VDU 23,1,0;
  0,0,0;
50 VDU 19,0,2,
  0,0,0
60 VDU 19,3,6,
```

WHEN I program on my Electron in "normal" Basic I seem to be able to enter and leave an 80 column mode without difficulty.

If, however, I use the procedure method of programming, I get "Bad mode" coming up

whether I try to enter the 80 column mode from within the procedures or from without.

Can you tell me what I am likely to be doing wrong? — **J.M. Layton, Wellingborough.**

● The short answer is that you can't change

your mode in a procedure.

The Electron uses part of its memory as a sort of electronic scrap pad. Here it keeps track of things like the variables used.

When you change mode in a procedure,

the use of memory is changed and the scrap pad can be overwritten — with the results you have seen!

Having said that, we have little doubt that we'll be inundated with letters telling us how to do it!

0,0,0

70 COLOUR 128

80 VDU

23,225,249,

124,46,31,63,

62,30,12

90 VDU 23,226,62,

124,232,240,

248,248,240,

96

100 VDU 23,227,3,

7,15,15,55,

127,254,253

110 VDU 23,228,

128,192,224,

224,216,252,

254,126

120 REPEAT

130 count=0

140 REPEAT

150 A=RND(3)

160 COLOUR A

170 count=

count+1

180 X=RND(36)+1

:Y=RND(30)

190 PRINT

TAB(X,Y)

CHR\$(225);

CHR\$(226)

200 PRINT

TAB(X,Y-1)

CHR\$(227);

CHR\$(228)

210 UNTIL

count=30

220 FOR pause=1

TO 1000:NEXT

230 CLS

240 UNTIL FALSE

● Thanks for the program — not bad after only seven weeks!

Going round in circles...

IN the March 1984 *Micro Messages* Hasan Babut wanted to know how to draw circles. I've written a short program that will do this:

10 MODE 1

20 FOR A=0 TO

2*PI

STEP 0.01

30 PLOT 69,649+

440*SIN(A),

512+400 *

COS(A)

40 NEXT

— **Brian Lord, Erith, Kent.**

● Thanks for the pro-

gram, Hasan's letter certainly generated a lot of interest.

Bad program made good

BY mistake we have recorded over the end of a very long program and we are now getting a "Bad program" error.

Is there any way that we can copy the listing from tape into the computer so that we can re-enter the program lines that have been deleted?

We tried to use "File" but this didn't work. — **Sarah and Rachel Boxall, Stansted, Essex.**

● Much as it pains us to refer to it, you'll find the solution to your problem in Frank Dart's article on page 113 in the March 1984 issue of *The Micro User*.

This brings up another point. What do our readers think about our reprinting some of the more relevant articles that have appeared in *Micro User* in our far

superior publication?

So far we've stuck to material that was published in *The Micro User* before *Electron User* existed. Should we change this policy? Over to you.

DO you like us or do you hate us? Are our games too hard or too easy? And what about the articles?

Write to us at Micro Messages and tell us. We can take it!

Remember, that these are the pages that you write yourselves. So tear yourself away from your Electron keyboard and drop us a line.

The address is:

**Micro Messages
Electron User
Europa House
68 Chester Road
Hazel Grove
Stockport
SK7 5NY.**



SPECIAL OFFER!
Debut £11 per cassette when
ordering 2 or more.

TOP QUALITY SOFTWARE FOR THE ACORN ELECTRON

**ACORN
ELECTRON**



CENTIBUG

£7.95

The centibug descends from the top of the screen weaving intimidatingly between the mushrooms. Your objective is to shoot all the segments of the centibug before it reaches the bottom of the screen.

Features include: spiders, snails, flies, 6 skill levels, hi-score, rankings, and increasing difficulty.



ALIEN DROPOUT

£7.95

A novel and unusual program. Arcade-action with this exciting multi-stage shooting game. The objective of the game is to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground. The game features include: 6 skill levels, rankings, hi-score, increasing difficulty.



INVADERS

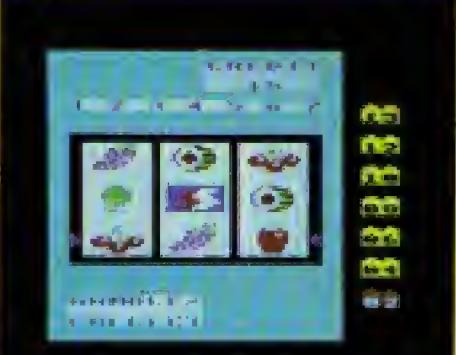
£7.95

48 marching invaders drop bombs that slowly erode your defences, and two types of spaceship (normal and double speed) fly over releasing large bombs that penetrate through your defences. Increasing difficulty, hi-score, rankings, superb graphics and sound.

WORLD GEOGRAPHY

£7.95

This program covers 166 countries which are divided into 8 categories of difficulty. Each country is pinpointed on an accurate hi-resolution screen map of the world, and the user is asked the capital and/or population. At the end of the test, the percentage of correct answers is given, so that the student can easily monitor his increasing geographical knowledge.



FRUIT MACHINE

£7.95

Probably the best fruit machine implementation on the market. This program has it all... HOLD, NUDGE, GAMBLE, spinning reels, realistic fruits and sound effects, multiple winning lines. This is THE fruit machine program to buy.



CONSTELLATION

£7.95

This fascinating program enables the user to "view the stars" from any point on the Earth's surface, on any date and at any time. A total of 455 stars in 50 constellations may be viewed, and the "telescope" may be moved up, down, left or right, zoomed in or zoomed out. The stars can be displayed by magnitude or constellation.



DISASSEMBLER

£7.95

A relocatable disassembler which, unlike some similar programs, allows the disassembled source code to be output to memory. It may then be modified and re-assembled. Other features: page-mode option, output to printer if required, output of ASCII symbols if required.

WE PAY UP TO 20% ROYALTIES FOR HIGH QUALITY BBC MICRO AND ELECTRON PROGRAMS



SUPERIOR SOFTWARE LTD.
Dept. EU4, Regent House,
Shinewater Lane, Leeds 7
Tel: 0532 459453

© Superior Software Ltd. 1985. All rights reserved.
No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in whole or in part, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner.

PROGRAM POWER MICROPOWER

KILLER CRUISE

A SUPERB B.B.C. MICRO AND ELECTRON PROGRAM FROM BRITAIN'S LEADING SOFTWARE HOUSE!

Scale the ironwork tower to answer the maiden's cries for help. Race along girders, career along conveyors, climb ladders and jump onto moving elevators. Leap the barrels and fireballs or smash them with the hammer. A sensational machine

Code games for the BBC micro and the Electron

Only £7.95 (inc.VAT)



AVAILABLE FROM ALL GOOD RETAILERS INCLUDING SELECTED
BRANCHES OF W. H. SMITH. **WRITTEN ANY PROGRAM?**
JOHN MENZIES AND BOOTS. **WE PAY 20% ROYALTIES!**

The following top titles are available for both the BBC Micro and Electron - *Postman* £6.95 / *Bandit at 3 o'Clock* £6.95 / *Mooneater* £7.95 / *Croaker* £7.95 / *Felix, in the Factory* £7.95 / *Felix and the Fruit Monsters* £7.95 / *Chess* £7.95 / *Draw* £9.95 / *Escape from Moonbase Alpha* £7.95 / *Cybertron: Mission* £7.95 / *Swoop* £7.95 / *Intergalactic Trader* £9.95

PROGRAM POWER MICROWAVE POWER